RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (2007) AND DEPARTMENT PROTOCOLS.

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Linked Trust Strategies and Policies	**Clinical Governance** **IR(ME)R 2000 Procedures and protocols**

TABLE OF CONTENTS

INTRODUCTION

This document has been written in line with Ionising Radiation (Medical Exposure) Regulations 2000(IR (ME) R) 2000 legislation to ensure that local Radiology referral protocols are communicated to all referrers utilising the services of Radiology.

The new regulations came into force in January 2001 and replace the Protection of Persons undergoing medical Exposure or Treatment 1988 (POPUMET 1988). This new legislation identifies changes, which have a significant impact on the requesting, reporting and management of the referral to Radiology.

Some of the specific impact is discussed below (a full copy of the legislation is available from Radiology if required)

In line with IR (ME) R 2000, a correctly completed Department of Radiology referral must be submitted prior to investigation for every Radiological examination. This should be completed electronically when electronic access is available. Paper requests will only be accepted where electronic access is not available.

The patient must be identifiable from the request card. Name, Date of birth, address hospital number and/or NHS number, if available must all be present.

Clinical details must conform to those in the Radiology department protocols enclosed. If they do not, or there is insufficient information to justify the x-ray, then the examination cannot be performed.

The referrer must be identifiable. If the request is not submitted electronically there must be the referrer's signature and name written legibly in block capitals

For females of reproductive age where the investigation involves irradiating the abdomen and all nuclear medicine examinations, the date of the last menstrual period must be written. If the examination is to be carried out whilst the patient is pregnant then the form should be signed accordingly.

If the request card is incompletely or illegibly completed, legally the examination cannot be performed under this legislation.

Under IRMER legislation the referrer must supply sufficient medical information to enable the practitioner to justify the exposure. It is intended that the following protocols will assist the referrer to ensure that the patient receives an exposure to

radiation only when the result will affect the management of that patient, thus keeping the overall dose to the population as low as reasonably achievable.

If you have any questions relating to the protocols or need further clarification on any issue relating to the IRMER regulations please contact a Consultant Radiologist or Advanced Practitioner Radiographer who will be happy to offer assistance and support as appropriate.

DEPARTMENT OF RADIOLOGY

STANDARD RADIOGRAPHIC PROJECTIONS

AREA	PROJECTION	GRID	COMMENTS
TORSO			
Abdomen	Supine	√	? Perforation, erect chest also required. Diaphragm to symph must be included, especially for customs cases. Additional lateral rectum may be required for customs cases or for ?FB rectum
Chest	PA	√	Lateral view if indicated from PA film, or if requested by thoracic team.
Ribs	PA Chest		Oblique if indicated
Thoracic Inlet	Penetrated PA LAT soft tissue neck LAT Thoracic Inlet	√	AP and lateral thoracic inlet must include the bifurcation of the trachea.
UPPER LIMB			
Shoulder following trauma	AP Axial		Lateral scapula for post trauma patients who cannot obtain the axial. Axial or inferior superior are the preferred second projectoin Post Dislocation films. AP only.

Shoulder for GP patients			AP View Coned AP 45 degree oblique to demonstrate gleno-humeral joint Axial view performed only if ? stability or inadequate demonstration of gleno-humeral on coned AP view. NB: Supraspinatus views performed as requested, 10-15 degree caudal angle centred at thr posterior superior aspect of the humeral head..
Clavicle	AP AP20		AP 20 to show the degree of displacement of the fracture site.
Sternum	Lateral		
Acromio-Clavicular Joints	AP (coned to joint)		Weight bearing and non weight bearing of both sides
Sterno Clavicular Joints	PA OBLIQUES		Cone to include both joints on each film.
Humerus	AP Lateral		To include both joints on film
Elbow	AP		To visualise radial head Externally rotate arm on AP view.

	Lateral		
Forearm	AP Lateral		To include both joints
Wrist Wrist Instability Series Ulna Variance Views X-ray wrist with clenched fist – DP & horizontal beam lateral, both sides	AP Lateral Clenched fist DP & lateral – both wrists Shoulder & Elbow MUST be at 90 degrees 4 views in total)		True lateral is very important Injured side only DP radius and then with ulna deviation (6 views in total)
Scaphoid (on initial visit)	PA PA 30 Lateral Oblique		With ulnar deviation.
Hand	PA Oblique		For? FB do a lateral If fracture 5th MC do true lateral
Fingers	PA		Always include one finger either

	Lateral		side of injury.
LOWER LIMB			
Femur	AP Lateral		Place film diagonally Both joints to be viewed
Knee	AP Lateral		Trauma knees should be done horizontal beam on 24x30 Standing knees as requested from orth. Clinic. Skyline views should be routinely undertaken for all GP and OP referrals Oblique views at the request of T&O for ? tibial plateau fracture.
Tibia & Fibula	AP Lateral		Both joints must be visualised.
Ankle	AP Lateral		The whole of the joint needs to be visualised on the AP view
Foot	AP Oblique		Lateral for FB
PELVIS			
Pelvis/hips	AP	√	1.Frog lateral for Perthe's disease.(Lead protection should be used on all follow up) 2.Lateral hip at request of T/O

			usually for sub capital fracture assessment. For initial visit always do both hips with AP of the affected hip for follow up visits Include the distal stem of any hip prostheses.
Sacro-iliac Joints	PA 15-20 Obliques caudally	√	Prone or supine oblique if requested separately without pelvis or if SIJ clearly seen on AP pelvis.
SPINE			
Cervical Spine	Lateral AP Open Mouth (trauma only)	 √ √	Open mouth only for trauma. Must visualise C7-T1 on lateral Flexion and extension/ swimmers as requested. 3. Oblique views of the c.spine may be requested in trauma cases if appropriate.
Thoracic Spine	AP Lateral	√ √	Long exposure time for lateral.
Lumbar Spine	AP Lateral L5 S1 if not shown on the lateral	√ √ √	1.If done in conjunction with a pelvis AP can be done on a 24x30 2. Must include the SIJ. Coned L5-S1 must be done if not shown on the lateral film
Sacrum	AP15	√	

	Lateral	√	

SKULL			
Skull	PA 20 Townes Lateral	√	Horizontal beam for trauma
Facial Bones	OM OM 30	√	Slit townes for zygoma
Orbits	OM OM30	√	For FB PA 30 caudal (slit beam) eyes looking up.If FB present do look down.
Mandible	PA Lateral Obliques PA Open & Closed TMJ on OPG machine	√	For trauma For swelling For TMJ subluxation OPG for ? dental abscess Loose dentition post trauma
Mastoids	Slit Townes Obliques	√	
TMJ	Lateral Obliques 25 caudal tilt	√	Both sides open and closed.
Sinuses	OM Lateral	√	Horizontal beam for all views
Parotid Gland	PA Obliques Lateral	√	

Sub-Mandibular Gland	PA Lateral-Tongue Depressed Intra-oral	√	
Swallowed Foreign Body	LAT Soft Tissue Neck CXR AXR not routinely indicated		If swallowed <30 minutes ago Chests only are done if: • ? inhaled FB- view should be taken on expiration **Immediate** Chest & Abdomen if: • Potential / suspected ingestion of button battery (child 6 years & under); may be un-witnessed ingestion Chest & Abdomen for known ingestion of button battery if • symptoms develop • post 4 days ingestion if > 15mm cell by child< 6years • post 10-14 days ingestion to confirm passage Except for sharp or potentially poisonous objects i.e. batteries.

SKELETAL SURVEY VIEWS

PATHOLOGY	VIEWS	COMMENTS
O.A./R.A.		
Initial Visit	Routine views of areas requested	
Follow-up		
Hands Hands & wrists	PA only on follow up assessments	If request asks for hands and wrists aim to include as much of the wrist as possible. Separate wrist views are not necessary.
Knees	AP	
Ankles	AP	
Feet	AP	
Shoulders	AP	To show joint space clearly (please clarify are we looking for gleno-humeral joint?) in all cases.
Hips	AP	Pelvis to include iliac crests and greater trochanters.

SKELETAL DYSPLASIA SURVEY

Chest	PA/AP	As appropriate
Pelvis	AP	As appropriate
Skull	Lateral	As appropriate
Left humerus	AP	As appropriate
Left Forearm	AP	As appropriate
Left hand	DP	As appropriate
Left femur	AP	As appropriate
Left tibia/fibula	AP	As appropriate
Thoraco-Lumbar Spine	AP/Lateral	As appropriate

RENAL SKELETAL SURVEY

AREA	VIEW
Chest	PA
Pelvis	AP
Skull	Lateral
Thoracic Spine	Lateral
Lumbar Spine	Lateral
Hands (both)	PA

MYELOMA SKELETAL SURVEY

Chest	PA
Pelvis	AP
Skull	Lateral
Thoracic Spine	Lateral
Lumbar Spine	Lateral
Humeri	AP
Femora	AP
MRI FULL SPINE	When appropriate instead of plain films

NB Allocate images to Dr B Miller and Dr S Cooper at BHH/SH and Dr M Cleasby at GHH.

BONE AGE

Non dominant Hand and wrist	PA Can be performed via G.P. referral

N.b. X-rays should be performed in line with departmental protocol an example of which can be found in each viewing area . The following criteria should be followed:

The non dominant hand and wrist should be included with the axis of the middle finger in direct axis with forearm.

The upper arm and forearm should be in the same horizontal plain

Tube should be centred above the head of the 3rd metacarpal

The FFD should be 76cms

The fingers should be positioned so that they are just not touching with the thumb in a comfortable position at about 30 degrees to the first finger.

PROTOCOL FOR RADIOLOGY IN SUSPECTED NON ACCIDENTAL INJURY IN CHILDREN

Protocol for the Provision of Forensic Radiography in Suspected Non Accidental Injury in Paediatrics

Training Requirements

Training on local NAI procedures- Documented on induction sign off.

Safeguarding Children Level 1 (covered within mandatory training day

bi- annually)

Safeguarding Children Level 2 (mandatory training tri-annually).

Pre Examination

'Procedures to be followed for ALL Forensic Investigations' should be read prior to undertaking this examination.

Examination requested = XR Skeletal survey non-accidental injury (XSSNA).

The referral should originate following discussion with a Paediatric Consultant and be discussed with an appropriate supervising practitioner (Consultant Radiologist).

The request is to be authorised by an appropriate supervising practitioner, indicating this in the Practitioner and Intended Radiologist fields on CRIS. The examination is to be carried out within 24 hours wherever possible.

Exceptional circumstances, for example an unstable clinical condition, may delay the performance of the skeletal survey. Where a child remains as an in-patient and when there are no child protection concerns about siblings within the home, it may be deferred for up to 72 hours.

The ward should be verbally informed of an appointment date and time, between the hours of 9am – 5pm, and those parents / carers need to be presented with information about the risk/benefit of radiation in order to ensure that proper consent is achieved. If the clinician is in doubt of this – contact Radiology. A 'Parental agreement to investigation or treatment for a child or young person' consent form will be completed prior to the child attending the department. It is

NOT the radiographer's responsibility to give this information OR to gain consent. Document appointment date and time of the examination and the named nurse of whom this was communicated to in the 'Event Comments' field on CRIS.

Examination

An appropriate room will be nominated within departments, preferably where Direct Digital Radiography Equipment can be used. Ensure the date and time is correct before carrying out any imaging.

The examination must be performed by 2 qualified radiographers – one of which should be Band 6 or above. The witness, i.e. a paediatric nurse or other healthcare professional from the paediatric department must be present throughout the entire examination and must not leave the child unattended at any time.

The child will be escorted by a paediatric health professional and may be accompanied by the child's parents (as long as this has not been prohibited earlier by the appropriate agencies). However, if there are concerns about either the safety of the child, or adequacy of examination it may be appropriate for the child to be accompanied only by a member of the paediatric team. Occasionally it may be necessary to contact security to provide support. Both radiographers' are responsible for verifying the consent form and scanning this document into CRIS.

Complete the 'Suspected Non Accidental Injury Skeletal Survey' form whilst carrying out the examination (Refer to IR(ME)R Appendix 8).

During imaging, particular attention must be paid to achieving optimal views of the metaphyseal regions. Lateral views of any suspected shaft fractures should be obtained. Seek an appropriate practitioner's advice if needed.

The skeletal survey is the forensic evidence and as such all views should be obtained. Therefore, the following radiographic protocol is to be followed for ALL cases of Suspected Non Accidental Injury unless the appropriate supervising practitioner indicates otherwise (i.e. a fracture has already been identified upon admission and doesn't require further imaging – this should be documented within the event comments on CRIS.):

Skull

AP , Lateral and Townes Skull X-rays should be taken with the skeletal survey even if a CT scan has been or will be performed.
Chest AP including the clavicles and inferior ribs. Left and Right Oblique views of both sides of the chest and inferior ribs.
Abdomen AP of abdomen including the pelvis and both hips.
Spine Right Lateral: this may require separate exposures of the cervical, thoracic and thoraco-lumbar regions. If the whole of the spine is not seen in the AP projection on the chest and abdominal imaging then additional views will be required. AP views of the cervical spine are rarely diagnostic at this age and should only be performed at the discretion of the supervising practitioner.
Limb AP of Both Humeri AP of Both Femora AP of Both Tibiae & Fibulae DP of Both Hands DP of Both Feet

N.B. Each anatomical area should be imaged with a separate exposure to optimise image quality.

Post Examination

Once the examination is completed all imaging MUST be viewed by the appropriate supervising practitioner before the child leaves the department. Requests for lateral coned views of the elbows / wrists / knees / ankles to demonstrate metaphyseal injuries may now be requested.

Further imaging of the chest may be required at approximately 14 days post skeletal survey to check for callus formation in the ribs. The appropriate supervising practitioner should make the decision as to whether this is necessary. The referring clinician MUST be informed immediately if the child does not attend for their follow-up imaging.

The following paperwork should be scanned into CRIS:

Copy of the Electronic Request / Order which accompanies the patient's notes

Consent Form

Forensic Investigation Form

Suspected NAI Skeletal Survey Form

The number of images sent to PACS and included on the CD must be recorded on the documentation, and all documentation must be scanned onto CRIS system on completion of examination.

If a request is made for a NAI Skeletal Survey out of hours the consent of the on-call Consultant Radiologist should be gained before commencing the examination.

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS (GENERAL EXAMINATIONS)

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS

RADIOLOGY DEPARTMENT – ALL REFERRALS

PATIENT PREPARATION

Remove all clothing and jewellery from the area under investigation whenever possible.

AVERAGE EXPOSURE FACTORS

As per Departmental Exposure Charts.

All exposure factors must be recorded on the patient referral, and scanned onto the CRIS System.

AFTER CARE

Inpatients –Please ensure all relevant images are on PACS before the patient is returned to the ward.

Outpatients – Dependent on Clinic, check with patient or Clinic.

GP Referrals – Patients are asked to make an appointment to see their GP to obtain their results (time scales may vary according to turnaround please clarify with Senior Radiographer in charge of area when appropriate).

CHECKING PACS

The PACS system must be checked by the operator to ensure that all the relevant images have transferred. The appropriate CRIS field in the post processing mode must be filled out to include the number of images that have been checked and sent to PACS. The number of images rejected must also be recorded.

Although every effort has been made to produce a comprehensive list of Radiographic protocols, if in doubt regarding authorisation, please seek advice from the duty Radiologist.

EXAMINATION PROTOCOL NO 1
AREA: SKULL

VALID REASONS FOR EXAMINATION

TRAUMA: Please follow the Trust's head injury policy.

Adults

Conscious patients (GCS 15/15) with no indication for CT in whom a possible retained foreign body is suspected.

Children

There is little, or no role for skull x-rays in children. Consideration for skull x-rays in children should be discussed with a Radiology Consultant. Please also refer to the Trust Guideline for Emergency CT scanning.

In the imaging of NAI please refer to the specific protocol. Skull x-rays are usually indicated. Please seek discussion with a Consultant Radiologist.

Other Presentations:

Hydrocephalus ? Shunt function – radiograph whole of valve system.

Abnormalities in head circumference in paediatrics

STANDARD PROJECTIONS

PA 20

Townes

Lateral – Horizontal beam for all trauma examinations.

ADDITIONAL PROJECTIONS

Soft tissue projections looking for foreign bodies, tangential often useful.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Skull X-rays not required before CT.

Skull X-rays not routinely indicated for :

-Pituitary/Juxta-sellar problems

-Dementia

-Memory disorders

-Visual disturbances / headache

-Epilepsy (adult)

Paediatric skull imaging is indicated in ? early sutural fusion.

PA, Townes and lateral projections are required.

EXAMINATION PROTOCOL NO 2
AREA: FACIAL BONES / ORBITS

VALID REASONS FOR EXAMINATION

Orbital Trauma: Blunt injury

? Blow out fracture

Penetrating injury

?FB

Middle third facial injury

Facial Trauma: Advisable to delay x-rays if possible in uncooperative patients

STANDARD PROJECTIONS

OM

OM 30

ADDITIONAL PROJECTIONS

Slit Townes for Zygoma

For FB orbits PA 30 caudal (split beam) eyes looking up if FB present do eyes down

A Tangential view is also useful to visualise foreign bodies within the soft tissues of the face.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Nasal Trauma – X-rays not indicated

EXAMINATION PROTOCOL NO 3
AREA MANDIBLE
TEMPORO MANDIBULAR JOINTS

VALID REASONS FOR EXAMINATION

Mandibular Trauma

TMJ Subluxation

Bony swelling? Cystic tumour

STANDARD PROJECTIONS

For Mandibular trauma: PA mandible and lateral obliques.

For TMJ Subluxation: TMJ Programme on Orthopantomograph, open and closed views.

For Bony swelling ? cystic tumour: PA Mandible

OPG- for dental abscess, and for assessment of loose dentition post trauma

OPG and lateral cephalostat- for orthodontic assessment.

ADDITIONAL PROJECTIONS

Lateral

Lateral Obliques

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

TMJ dysfunction – X-rays not routinely indicated.

Specialist ENT/Maxillofacial/Rheumatology referrals may considered following discussion with a Consultant Radiologist.

EXAMINATION PROTOCOL NO 4
AREA: SINUSES

VALID REASONS FOR EXAMINATION

X-rays not indicated.

CT indicated if symptoms of acute sinusitis persist following 10 days of treatment if it will alter clinical management.

STANDARD PROJECTIONS

OM (Horizontal beam for all views)

lateral

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

CT is the investigation of choice; however the referral for a CT scan must be made by an ENT clinician.

EXAMINATION PROTOCOL NO 5
AREA: MASTOIDS

VALID REASONS FOR EXAMINATION

X-rays not indicated.

STANDARD PROJECTIONS

Slit Townes

Lateral oblique

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 6
AREA: CERVICAL SPINE

VALID REASONS FOR EXAMINATION

Trauma:

Please refer to Guideline for Emergency CT scanning on Trust intranet.

Congenital disorders following discussion with a Radiologist may be indicated in certain circumstances. e.g in children

Possible Atlanto-axial subluxation e.g. Rheumatoid arthritis– Flexion lateral

Spondylosis with associated neurological signs or symptoms (see additional information below.)

STANDARD PROJECTIONS

AP

Lateral

Odontoid Peg AP (Trauma only)

ADDITIONAL PROJECTIONS

Swimmers view to show C7/T1 (grid)

Neck injury with pain, initial X-rays normal suspect ligamentous injury:-

Flexion/extension laterals – under medical supervision

Scoliosis – Full length standing radiograph (Orthopaedic referral only)

For patients referred with rheumatoid Arthritis or Ankylosing Spondylitis a lateral view with flexion and extension should be performed.

For Rheumatoid Arthritis an AP peg view should also be performed.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

X-rays not routinely indicated :-

Neck pain (non trauma),

Degenerative disease with no radicular symptoms

Pain alone typical of spondylosis is not an indication for x-rays and are only indicated if pain is associated with neurological signs/symptoms e.g pain,weakness, paraesthesia in the distribution of a nerve root (e.g. pain radiating down the arm).

EXAMINATION PROTOCOL NO 7
AREA: THORACIC SPINE / LUMBAR SPINE

Symptoms of thoracic and lumbar spine degenerative disease are very common and should not normally require radiographic investigation. MRI is the investigation of choice for suspected disc prolapse - plain films may be normal and falsely reassuring.

Imaging will not routinely be considered until the patient has been managed conservatively for a period of at least six weeks with no clinical improvement unless there are significant red flag neurological signs. (See below)

VALID REASONS FOR EXAMINATION

Chronic low back pain with no associated neurological signs would ***not*** normally be an indication for radiography. Degenerative changes are invariably present from middle age onwards.

Patients under 20 years or over 50 years in whom there is unexplained back pain not responding to simple analgesia, may be investigated by plain films or specialist referral. Again the six week rule is suggested unless there are serious concerns regarding neurological or associated systemic symptoms.

Trauma with pain:

Significant fall

High impact RTA

Other spinal fracture present

Trauma with neurological deficit with or without pain

? Osteoporotic collapse

? Osteomyelitis

Spondylosis with neurological signs or symptoms e.g. sciatica

Indications for MRI of the Lumbar Spine

Any neurologic deficit, evidence of radiculopathy, cauda equina compression (e.g., sudden bowel/bladder disturbance)

OR

Suspected systemic disorder with associated symptoms/signs related to the back (i.e., to rule out metastatic or infectious disease)

OR

Localized back pain with radiculopathy, following failed 6-week course of conservative care

STANDARD PROJECTIONS

AP

Lateral

ADDITIONAL PROJECTIONS

Coned L5/S1 view if not shown on the lateral.

Oblique view – Following discussion with a Radiologist ,if Spondylolisthesis is suspected on standard views. Routine oblique views not appropriate.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Long exposure time for the lateral thoracic spine as per departmental protocols.

X-rays not routinely indicated:

Pain without associated trauma if likely to be simple musculoskeletal/degenerative disease

Chronic back pain with no pointer to infection or neoplasm.

An urgent specialist referral is advised for back pain with the following red flag signs:

Sphincter or gait disturbance

Saddle anaesthesia

Severe or progressive motor loss

Widespread neurological deficit

Previous carcinoma

Systemically unwell or other features of systemic illness.

EXAMINATION PROTOCOL NO 8
AREA: PELVIS/ HIP

VALID REASONS FOR EXAMINATION

Hip pain characteristic of osteoarthritis is not an indication for radiography unless symptoms are such that a referral to an orthopaedic surgeon is being considered; or if presentation is atypical and raises other possibilities such as :-

Inflammatory arthropathy,

Avascular necrosis or infection.

Other indications include:-

Fall with inability to weight bear

Foreshortened, internally rotated limb

Painful prosthesis

Severe OA where surgical joint replacement is considered.

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

STANDARD PROJECTIONS

AP Pelvis/Single Hip

Lateral hip post trauma is not indicated unless specifically requested by the Consultant Orthopaedic Surgeon.

USE OF HIP SCALING TOOL

The Orthopaedic Templating tool should be applied to the AP image,

1. Position the patient to include upper 1/3 of the femoral shaft on the pelvis image.

2. Position the marker at the level of the greater trochanter on the lateral side of the pelvis.

3. Unless the patient is narrow at the hip .The marker will be projected beyond the margin of the image; therefore move the marker carefully to the same vertical height level between the thighs, where it will be visible to the radiation field.

N.B. A&E Trauma Referrals-

The full area of interest for Pelvic bony anatomy must be included on all imaging.

A calibration marker should be applied, however it is understood that this may not be visible on your resultant image following post-processing.

You **do not need** to undertake further imaging if the marker is not visible – T&O will review the patient and decide if further imaging is required with the calibration marker demonstrated.

Exclusion Criteria

G.P Attendances, unless referral to an Orthopaedic Surgeon is being considered for joint replacement.

Paediatric Patients below the age of 16.

Any in patient post-op x-rays

Post op x-rays when the joint has already been replaced unless patient is for revision surgery.

ADDITIONAL PROJECTIONS

Muller's View- (for pre-op magnification views only)

AP Pelvis with disc markers

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Chest X-ray for fracture NOF - if X-ray clearly shows a fracture, the attending Radiographer to contact the referring clinician to agree the need for a CXR at the time of the initial referral if deemed clinically appropriate, please refer to page 45 for further information.

AP and Lateral projections for post op DHS examinations should be discussed with the referring clinician to ensure the request is fully justified, as images are obtained during the procedure in theatre.

AP only for post hip replacement. A lateral view may be indicated if specifically requested by an orthopaedic surgeon.

SACRO-ILIAC JOINTS

Indications: ?sero-negative arthropathy

APPLICATION OF GONAD LEAD PROTECTION FOR PAEDIATRICS

After the patients first attendance; any follow-up imaging should have gonad lead protection applied.

EXAMINATION PROTOCOL NO 9
AREA: SACRUM

VALID REASONS FOR EXAMINATION

Trauma

Pain with suspected tumour or infection

STANDARD PROJECTIONS

AP 15 (Cranial)

Lateral

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Trauma to Coccyx – X-rays not indicated as it will not alter patient management.

EXAMINATION PROTOCOL NO 10
AREA: CHEST

VALID REASONS FOR EXAMINATION

Pneumonia - initial presentation and follow up to assess resolution

? pleural effusion

Haemoptysis

Chest wall pain

Weight loss

Dyspnoea ? cause

Exacerbation of COPD

Any signs symptoms suggestive of a bronchogenic carcinoma

? Inhalation of foreign bodies

Emigration screening

For hospital specialties

Central chest pain ? MI

? aortic dissection- acute

As requested by Cardio-thoracic team

Symptoms indicating tumour

Haemoptysis

Staging extent of tumour

Metastases

Bronchiolitis in paediatrics

Follow up for TB contact

Trauma

? Pneumothorax

Fluid or lung contusion

Penetrating injury

Sternal fracture

Aortic injury

?Oesophageal perforation

Neonatology / Paediatrics

Respiratory Distress Syndrome (RDS)

Broncho Pulmonary Dysplasia (BPD)

Pulmonary Interstitial Empyema (PIE)

Chronic Lung Disease

Meconium Aspiration Syndrome

Pneumothorax

Chest Infection

Abnormal blood gases

Pneumomediastinum

Position of catheters/lines/tubes

Pleural Effusion

Previous antenatal ultrasound abnormality suspected

Congenital Heart Disease

Post Operative

? Ingestion of button battery; children 6 years old and under (could be suspected as unwitnessed)

Known ingestion of button battery if

- symptoms develop
- post 4 days ingestion if > 15mm cell by child< 6years
- post 10-14 days ingestion to confirm passage

STANDARD PROJECTIONS

PA

ADDITIONAL PROJECTIONS

AP only if unable to obtain a PA view due to patient condition.

Apical projection – suspected opacity at lung apices if PA film equivocal.

Lateral sternum for ? fracture

Lateral view:

- to clarify suspected abnormality seen on PA

- when requested by a Consultant Radiologist

Chest x-rays are not routinely performed for the placement of naso-gastric tubes. Please refer to Trust guidelines on enteral feeding on the intranet.

NG Tube Guidance

If the referral meets the Trust guidance for imaging (as above). The image will be reported by the Radiology registrar between the hours of 09:00-20:00 (Monday – Friday) and at the weekend and bank holiday between 09:00 – 17:00 with the report being made available on I-care.

Once the image has been performed this should allocated to the "ONCALL pot under the intended Radiologist".

It is the responsibility of the Senior Radiographer in charge of the general areas to check periodically that these images have been reported and contact the on call radiology registrar to highlight there are images for reporting that are outstanding.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

A Chest x-ray is not indicated for;

A Chest Radiograph is not indicated for? Rib fractures in the absence of any symptoms or signs of significant trauma- eg pneumothorax, haemothorax or flail chest as it does not lead to a change in the patient's management.

Expiration when a pneumothorax is suspected.

Uncomplicated URTI with no signs attributable to the Chest.

Non specific chest pain unless severe or persistent

Pre employment screening unless HCW's have lived or worked in a TB endemic area for 6 months or more within the previous 12 months.

"Routine Pre operative chest" is not an indication for a CXR.

Indications for pre operative CXR include:

Acute respiratory symptoms

Possible metastases

Suspected or established Cardio respiratory disease, who have not had a chest radiograph in the previous 12 months.

Recent immigrants from countries where TB still endemic who have not had a chest radiograph in the previous 12 months.

For the pre-operative fractured femur population only:

In order to comply with Ionising Radiation (Medical Exposure) Regulations 2000 legislation, it is no longer appropriate to request "routine pre-operative chest x-rays."

CXR should be requested when indicated below:

- Dyspnoea or acute cardio-respiratory signs/symptoms on admission
- If unable to assess pre-fracture exercise tolerance (e.g. immobility or history not forthcoming from patient i.e. confusion)
- If the patient is unable to cooperate when attempting to perform a respiratory examination
- Any suspected chest trauma
- Significant weight loss or possible metastases

The indication for a CXR must be clearly stated on the request form.

EXAMINATION PROTOCOL NO: 11
AREA: THORACIC INLET

VALID REASONS FOR EXAMINATION

Neck arm pain suggestive of vascular/nerve root compression.

STANDARD PROJECTIONS

Chest PA

Penetrated PA (to show trachea)

Lateral soft tissue neck (with Valsalva technique)

Lateral thoracic inlet (to show trachea and level of bifurcation)

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

AP and lateral thoracic inlet must include the bifurcation of the trachea

EXAMINATION PROTOCOL NO 12
AREA: ABDOMEN

VALID REASONS FOR EXAMINATION

Trauma – Blunt or penetrating injury

Acute abdominal pain ? Obstruction

A KUB film should not be requested as the initial investigation in patients where the cause of acute abdominal pain is thought to be due to a renal tract calculus as the investigation of choice is a CTKUB. A KUB should only be requested in the acute setting if the renal calculus demonstrated on CT is not visible on the CT scanogram.

N.B-KUB film on a new patient in clinic with suspected stones (e.g. from St Elsewhere/ Nursing Home), requested by a urologist may be useful as a screening radiograph for stone volume. This may be particularly useful for patients with long term catheters where bladder stones are suspected.

Inflammatory bowel disease: acute exacerbation

Post operative abdominal surgery – tenderness or distension of abdomen

? Obstruction

Suspected ingestion of illegal substances

KUB for follow up of known renal tract calculi

Lost IUCD following a negative ultrasound scan ONLY

NEONATOLOGY / PAEDIATRICS

Distended abdo ? obstruction

Necrotising Enterocolitis (NEC)

Meconium ileus

Suspected Intussusception

Position of Catheters & Lines

Previous antenatal ultrasound abnormality suspected

? Ingestion of button battery; children 6 years old and under (could be suspected as unwitnessed)

Known ingestion of button battery if

- symptoms develop
- post 4 days ingestion if > 15mm cell by child< 6years
- post 10-14 days ingestion to confirm passage

STANDARD PROJECTIONS

AP (radiograph must include both hemi-diaphragms – symphysis pubis)

ADDITIONAL PROJECTIONS

Erect chest - ? intra abdominal perforation when requested by referring clinician.

Neonatal Lateral Decubitus (Left side down) - ? Perf ? NEC

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Not indicated: acute GI bleed

Palpable mass

? Appendicitis

? Constipation

Biliary disease ? gall stones

Acute pancreatitis

UTI in adult

Suspected aortic aneurysm/rupture

Ingestion of foreign body unless there is clinical evidence of obstruction/perforation or suspected ingestion of button battery in child of 6 years or under

Erect films to look for fluid levels not indicated.

APPLICATION OF GONAD LEAD PROTECTION FOR NEONATOLOGY

After the patients first attendance; any follow-up imaging should have gonad lead protection applied.

EXAMINATION PROTOCOL NO 13
AREA: KNEE

VALID REASONS FOR EXAMINATION

Blunt trauma/fall with:

-inability to walk four or more weight bearing steps

-when patient is less than 12 or greater than 50 years old

-Pronounced bony tenderness – especially patella/head of fibula

-Knee pain with locking/restricted movement or effusion

? loose body

Degenerative changes are common. X-rays are only appropriate prior to surgery

Painful prosthesis to detect established loosening

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

The pathway below has been agreed between Radiology and Trauma and Orthopaedics to support decision making and potential onward referral for specialist advice.

Patients aged 55 years and over-

All patients should initially have plain x-rays of the affected joint(s) to include skyline views as standard. This includes history of

mechanical injury

severe persistent knee pain if considering specialist assessment/surgical intervention

symptoms of locking/giving way

?loose body

There is no indication for an MRI scan if the x-ray report suggests moderate to severe OA. This patient group require specialist referral with a view to either arthroscopy or consideration for joint replacement.

If the plain film shows no or minimal OA changes only, and the patient has symptoms of giving way or locking, then MRI can be considered prior to arthroscopy.

Patients with arthritic knees are unlikely to proceed to arthroscopy in the absence of mechanical symptoms (true locking and/or giving way)

Patients below the age of 55 -

These patients can proceed to an MRI scan if there is an appropriate indication

Mechanical injury

Severe knee pain/effusion following injury

Symptoms of locking/giving way

?loose body

If there are signs of significant OA and/or patient is known to have OA, an MRI scan should be preceded by a plain radiograph. The correct pathway is to refer the patients to the Orthopaedic Triage for assessment (or CLIKS in the case of BEN/Solihull GPs).

Patients attending A&E with acute symptoms related to the knee joint

These patients should be referred directly to the acute knee pain clinic or the daily fracture clinic in order to avoid delayed treatment as frequently these patients will progress directly to arthroscopy.

STANDARD PROJECTIONS

AP – Weight bearing for non-trauma

Lateral – (horizontal beam for all traumas)

Skyline views for all OP/GP referrals –please see above

Oblique for evaluation of tibial plateau fractures at request of T&O surgeon.

USE OF SCALING TOOL

The Orthopeadic Templating tool should be applied to the image.

A.P view.

This should be placed at the lateral side of the knee at the level of the femoral condyle.

Lateral View .

The tool should be placed on the anterior side of the knee either inferior or superior to the patella.

Exclusion Criteria

Any inpatient post op x-rays

Post op x-rays when the joint has already been replaced unless patient is for revision surgery.

Paediatric patients below the age of 16 years.

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 14
AREA: ANKLE

VALID REASONS FOR EXAMINATION

Acute ankle injury – adopt Ottowa guidelines below:

Ottawa guidelines

An ankle x-ray is required only if there is pain in the mallleolar zone and any one of the following

Bone tenderness along the distal 6cms of the posterior edge of the fibula or tip of the lateral malleolus

Bone tenderness along the 6cm posterior edge of the tibia or tip of the medial malleolus

Inability to bear weight for 4 steps both immediately and in the emergency department

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

STANDARD PROJECTIONS

AP

Lateral

ADDITIONAL PROJECTIONS

Mortice View

Axial Calcaneum

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Rarely do foot and ankle x-rays need to be taken together. Clinical abnormalities are usually confined to foot or ankle.

Lateral Calcaneum views are no longer required for ? calcaneal Spur and ? plantar fasciitis

EXAMINATION PROTOCOL NO 15
AREA: FOOT

VALID REASONS FOR EXAMINATION

Trauma: adopt Ottawa guidelines :

Foot x-ray required only if there is pain in the mid foot zone and any one of the following:

Bone tenderness at base of fifth metatarsal

Bone tenderness at the navicular bone

Inability to bear weight for four steps both immediately and in the emergency department

? FB

Hallux Valgus pre surgical assessment

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

STANDARD PROJECTIONS

DP

DP Oblique

ADDITIONAL PROJECTIONS

True lateral for Orthopaedic Clinic as requested

Axial for Calcaneal trauma

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

?FB True Lateral only

X-rays not routinely indicated:

?Plantar Fasciitis

? Calcaneal spurs

Calcaneal Spurs are common incidental findings. The cause of heel pain is rarely detectable on x-ray. The majority of patients should be managed on the basis of clinical findings without imaging.

In the assessment of Hallux Valgus as per orthopeadic referral weight bearing DP feet should be performed.

EXAMINATION PROTOCOL NO 16
AREA: FEMUR/ TIBIA/ FIBULA

VALID REASONS FOR EXAMINATION

Trauma

-with deformity, tenderness

-with Swelling

Atypical or localised pain where neoplasia or infection is suspected.

STANDARD PROJECTIONS

AP (including both joints)

Lateral (including both joints)

USE OF SCALING TOOL

The Orthopaedic Templating tool should be applied to the image.

AP View-

The marker should be placed midway between the anterior and posterior surfaces at the lateral side of the midshaft of the bone.

Lateral View-

Place the marker in the midline on the anterior part of the limb.

HBL-Place on the anterior aspect at the midline of the shaft of the bone.

Exclusion Criteria

Any inpatient post op x-rays

Post op x-rays when the joint has already been replaced unless patient is for revision surgery.

Paediatric patients below the age of 16 years.

ADDITIONAL INFORMATION

AP and lateral femur for fractured femoral neck.

Paediatric Emergency Department Referrals for ? fracture Femur:-

If there is a possible femoral fracture at the time of initial imaging ***AND*** there is a suspicious/unknown mechanism of injury ***THEN*** also obtain an AP Tibia and Fibula at the time of initial imaging (This is required prior to Gallows Traction being applied.)

Seek advice from the referrer and or Practitioner it there is any uncertainty of the clinical presentation/radiological findings.

EXAMINATION PROTOCOL NO 17
AREA: HAND

VALID REASONS FOR EXAMINATION

Trauma:

-With deformity and tenderness

-With Swelling

Suspected inflammatory arthropathy on presentation

Severe Arthritis if surgery is being considered.

Follow up arthritis at request of Consultant Rheumatologist

Bone age determination in paediatric population

Congenital anomalies

Endocrine disturbance

STANDARD PROJECTIONS

DP

DP Oblique

ADDITIONAL PROJECTIONS

True lateral for ? FB.

True lateral for fracture 5th metacarpal

True lateral for individual digits

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

DP both hands only for Arthritis follow up

Lateral hand projection is required for direction of displacement for metacarpal fracture/dislocation as per A/E and orthopaedic referral.

EXAMINATION PROTOCOL NO 18
AREA: WRIST

VALID REASONS FOR EXAMINATION

Trauma :

-With deformity, tenderness

-With swelling

Severe Arthritis if surgery is being considered

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

STANDARD PROJECTIONS

DP

Lateral

ADDITIONAL PROJECTIONS

On initial visit for scaphoid, the following additional views are required:

DP Oblique

AP with Ulna deviation 30 angle

Clenched Fist Specific Orthopaedic Request

Carpal Tunnel View

Left hand and wrist for bone age (see standard projections for protocol)

Wrist Instability Series

1. Clenched fist DP & lateral – both wrists
2. Injured side only DP radius and then with ulna deviation

(6 views in total)

Ulna Variance Views

Shoulder & Elbow MUST be at 90 degrees

Xray wrist with clenched fist – DP & horizontal beam lateral, both sides

(4 views in total)

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Always X-ray scaphoid out of plaster unless specially requested not to by Orthopaedic surgeon.

EXAMINATION PROTOCOL NO 19
AREA: ELBOW

VALID REASONS FOR EXAMINATION

Trauma ;

-With effusion

-With deformity, tenderness

-With swelling

Locking, suspected loose bodies

Severe Arthritis if surgery is being considered.

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

STANDARD PROJECTIONS

AP

Lateral

ADDITIONAL PROJECTIONS

Radial head view – where fractured radial head is suspected and not shown on standard views.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Follow up x-rays not indicated in effusion if no obvious fracture.

EXAMINATION PROTOCOL NO 20
AREA: SHOULDER

(to include acromio clavicular/sterno- clavicular joint /clavicle)

VALID REASONS FOR EXAMINATION

Trauma :

-With deformity

-With pain, swelling, tenderness

-? Dislocation

Pain ? Calcific tendonitis

Shoulder impingement syndrome

Degenerative changes in the acromio- clavicular joints are common and x-rays are not indicated routinely unless they will change management.

Severe arthritis especially if surgery is being considered.

Suspected inflammatory arthropathy on presentation

Follow up arthritis at request of Consultant Rheumatologist

STANDARD PROJECTIONS

AP

Axial – for all trauma examinations whenever possible.

Coned AP- 45 degree oblique to demonstrate gleno humeral joint.

For G.P/OP patients in addition to a straight AP.

ADDITIONAL PROJECTIONS

Lateral scapula – post trauma patients where an axial cannot be obtained.

Acromio-Clavicular joints – AP (coned to joint) – weight bearing and non weight bearing both sides.

Sterno-Clavicular joints – PA, 15-20 Obliques (coned to include both joints on each film.)

Y view-(as for true scapula view with 5-10 caudal angle) At request of orthopaedic surgeon performed at GH site.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Post dislocation AP film only

Fractured Clavicle AP and AP 20

EXAMINATION PROTOCOL NO 21
AREA: HUMERUS/RADIUS/ULNA

VALID REASONS FOR EXAMINATION

Trauma:

-With deformity, tenderness

-With swelling

Atypical or localised pain where neoplasia or osteomyelitis is suspected

Congenital anomalies

STANDARD PROJECTIONS

AP (including both joints)

Lateral (including both joints)

USE OF SCALING TOOL

The Orthopeadic Templating tool should be applied to imaging of the humeri.

AP View-

The marker should be placed midway between the anterior and posterior surfaces at the lateral side of the midshaft of the bone.

Lateral View-

Place the marker in the midline on the anterior part of the limb.

Exclusion Criteria

Any inpatient post op x-rays

Post op x-rays when the joint has already been replaced unless patient is for revision surgery.

Paediatric patients below the age of 16 years.

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

AP and lateral humerus for fractured humeral neck.

EXAMINATION PROTOCOL NO 22
AREA: MAJOR TRAUMA - (ATLS)

VALID REASONS FOR EXAMINATION

Perform only minimum X-rays necessary at initial assessment.

Chest - ? Pneumothorax

Pelvis – Fractures – Major Blood Loss

STANDARD PROJECTIONS

Supine Chest, Pelvis

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

If a patient presents for examination under the ATLS protocol and pregnancy status cannot be ascertained due to the patient's condition being life threatening as agreed by the referrer the examination can be justified as per Radiographic Referral and Justification protocols number 22, whereby the practitioner for the examination is the Clinical Director for Radiology.

EXAMINATION PROTOCOL NO 23
AREA: COLONIC TRANSIT STUDIES

VALID REASONS FOR EXAMINATION

Constipation
?Obstruction

STANDARD PROJECTIONS

AP abdomen

ADDITIONAL PROJECTIONS

As required by radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

NB: The 28 day rule should be applied as per department procedure at the onset of each stage of the examination to ensure pregnancy status throughout the examination.

Day 1 – Monday 9.00am: Do not attend the patient on CRIS – refer patient to the IP/OP Co-ordinator in the general viewing area. The patient should have x2 separate events using exam code: XCOLT which should have been booked in the diary on the following days of the same week.

Day 2 – Tuesday 9.00am: The first appointment event is to be attended on CRIS. The patient is then sent home to continue as normal.

Day 3 – Friday 9.00am: The second appointment event is to be attended on CRIS. The patient is then sent home and is informed of where results will be sent to.

Before sending the appointment letter out; the patient should be contacted to arrange a week they can attend. Inform the patient that they need to attend at 9.00 am on each day.

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS (MOBILE AND THEATRE EXAMINATIONS)

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

MOBILE SCREENING PROCEDURES

All requests requiring the mobile image intensifier must be requested before the start of the procedure. (Except in an emergency)

Although every effort has been made to produce a comprehensive list of radiographic protocols; if in doubt regarding authorisation please seek the advice of the duty Radiologist.

All screening times and exposures must be recorded in CRIS and on the request card/Exam summary as per directorate procedure.

EXAMINATION PROTOCOL NO: 1
AREA: TEMPORARY PACEMAKER

VALID REASONS FOR EXAMINATION

Brady Arrythmic – (Symptomatic or life threatening)

Overdrive for Tachy Arthymmias -

Atrial or Ventricular

STANDARD PROJECTIONS

PA

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

May need Chest X-ray post procedure

EXAMINATION PROTOCOL NO: 2
AREA: ERCP

VALID REASONS FOR EXAMINATION

Gallstones with dilated intra-hepatic ducts on ultrasound

Gallstones with abnormal liver function tests

Acute Pancreatitis

Pancreatic trauma

Dilated bile ducts on Ultrasound or CT

Pancreatic masses or cysts

Possible bile duct damage post surgery

Mal-absorption

STANDARD PROJECTIONS

Right posterior oblique – as directed by Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 3
AREA: PIC/ HICKMAN LINE

VALID REASONS FOR EXAMINATION

Permanent IV access

STANDARD PROJECTIONS

PA

As directed by the Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

May need chest x-ray post procedure

EXAMINATION PROTOCOL NO: 4
AREA: ON TABLE ANGIOGRAPHY

VALID REASONS FOR EXAMINATION

Acute Embolism

Trauma – to check circulation of distal limb

As adjunct to revascularisation procedure by Vascular Surgeon/Interventional Radiologist

STANDARD PROJECTIONS

PA

Lateral

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 5
AREA: P.C.N.L.

VALID REASONS FOR EXAMINATION

As approved by Radiologist

Extraction of stones

Endothelial Resection

STANDARD PROJECTIONS

AP

As directed by Radiologist

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 6
AREA: RETROGRADE PYELOGRAMS

VALID REASONS FOR EXAMINATION

Filling defects

Inadequate demonstration of pelvic/Ureteric systems on CT

Demonstration of Ureters

STANDARD PROJECTIONS

PA

As directed by Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 7
AREA: CYSTOSCOPY

VALID REASONS FOR EXAMINATION

Bladder tumour – Haematuria

Stones/FB Retrieval

Pre Trans urethral repair procedure

Demonstration of Urinary System

STANDARD PROJECTIONS

PA

As directed by Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 8
AREA: URETERIC STENT

VALID REASONS FOR EXAMINATION

The relief of obstruction – tumour, stones of the bladder, ureter or kidneys.

Post procedure oedema – temporary cover until inflammation is reduced.

STANDARD PROJECTIONS

PA

As directed by Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 9
AREA: URETEROSCOPY

VALID REASONS FOR EXAMINATION

Direct visualisation of Ureters

STANDARD PROJECTIONS

PA

As directed by Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 10
AREA: VASOGRAMS

VALID REASONS FOR EXAMINATION

Visualisation of:

-Stenosis

-Inflammation

-Pathology

Reversal of Vasectomy operation

STANDARD PROJECTIONS

PA

As directed by Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 11
AREA: OPEN REDUCTION INTERNAL FIXATION

VALID REASONS FOR EXAMINATION

Reduction of fractures.

Positioning of metal work to check position and length of screws to ensure they are not in the joint spaces before closure.

STANDARD PROJECTIONS

PA

Lateral

As directed by Orthopaedic Surgeon/Podiatric Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

When X-rays are taken in the Operating Theatre there is no need for check x-rays in the department unless there is a clinical reason to do so.

AO nailing will need departmental check x-rays in the majority of cases as the whole length of the bone needs to be visualised post operatively.

Departmental check X-rays required after fixing of Pathological fractures. To show extent of lesion to metal work.

EXAMINATION PROTOCOL NO: 12
AREA: MANIPULATION UNDER ANAESTHETIC

VALID REASONS FOR EXAMINATION

To evaluate position of fracture during manipulation.

STANDARD PROJECTIONS

PA

Lateral

As directed by the Orthopaedic Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 13
AREA: LOCATION OF LOST INTRA-OPERATIVE EQUIPMENT

VALID REASONS FOR EXAMINATION

? Lost swab/ other equipment

STANDARD PROJECTIONS

1 Ask surgeon to localise extent of incision.
2 If soft tissue only, ensure the relevant area is included on the Radiograph.
3 If a body cavity is included, ensure the whole area is included (eg. Whole abdomen) including peripheral soft tissues.
4 Consider use of mobile fluoroscopy if area of survey is large. Take spot images to document areas covered.

ADDITIONAL PROJECTIONS

Lateral may be required to localise.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

The images from a "? lost swab" case need to be promptly reported by a radiologist. The duty/plain film reporting radiologist should be informed of the case during the day and the on call radiologist should be informed if out of hours.

EXAMINATION PROTOCOL NO: 14
AREA: REMOVAL OF FOREIGN BODIES

VALID REASONS FOR EXAMINATION

Location of FB

Ensure complete removal

STANDARD PROJECTIONS

As required by Orthopaedic Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Departmental check x-rays not required.

EXAMINATION PROTOCOL NO: 15
AREA: ARTHROGRAMS

VALID REASONS FOR EXAMINATION

Visualisation of joint movement

CDH

STANDARD PROJECTIONS

As directed by Orthopaedic Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 16
AREA: REMOVAL OF METAL WORK

VALID REASONS FOR EXAMINATION

Location of broken screws/plates etc

STANDARD PROJECTIONS

As directed by the Surgeon

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Not routinely indicated except for the above.

MOBILE PLAIN FILMS

EXAMINATION PROTOCOL NO: 17
AREA: MOBILE CHEST

VALID REASONS FOR EXAMINATION

As per chest x-ray protocol

Mobile chest x-rays to be performed only in circumstances where medical condition of patient prohibits travel to X-ray Department.

Mobile x-rays are also performed on the neo natal unit for the following indications:

Hyaline Membrane disease
Congenital heart disease
BPD
PIE (Pulmonary interstitial empyema)
Chronic lung
Abnormal blood gases
Pneumomediastinum

STANDARD PROJECTIONS

PA)
AP) As appropriate to patient's condition
Supine)

NB An erect chest x-ray should be performed wherever possible

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 18
AREA: MOBILE SKELETAL RADIOGRAPHY

VALID REASONS FOR EXAMINATION

Where patients condition precludes them coming to the department. If requested seek advice from the duty Radiologist.

STANDARD PROJECTIONS

Area as requested per departmental protocols.

Keep number of projections to a minimum.

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 19
AREA: MOBILE ABDOMINAL RADIOGRAPHY

VALID REASONS FOR EXAMINATION

As per abdomen x-ray protocol

Mobile abdomen x-rays to be performed only in circumstances where medical condition of patient prohibits travel to X-ray Department.

Position of tubes in neonates

NEC (Necrotising enterocolitis)

STANDARD PROJECTIONS

AP

ADDITIONAL PROJECTIONS

Decubitus views may be undertaken to demonstrate perforation on the neonatal patient

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

CONTRA INDICATIONS AND ADDITIONAL INFORMATION

To be discouraged whenever possible due to poor radiographic quality, radiation hazard to other patients on the ward. Encourage attendance of patient to the x-ray department to enable department radiographs to be undertaken.

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS
FLUOROSCOPY EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

FLUOROSCOPY PROCEDURES

EXAMINATION PROTOCOL NO: 1
AREA: CONTRAST SWALLOWS / MEALS

High dysphagia.

Barium swallow before endoscopy is useful for high dysphagia. Subtle strictures, not seen at endoscopy, may be best demonstrated by semi solid bolus study during barium swallow. MDT approach with speech therapist and ENT surgeon is optimal

Low dysphagia

Endoscopy should be considered as the first- line investigation for recent onset progressive dysphagia in patients >40. Barium swallow is indicated to demonstrate motility disorder or subtle stricture if endoscopy is normal

Heartburn / Hiatus Hernia / Reflux

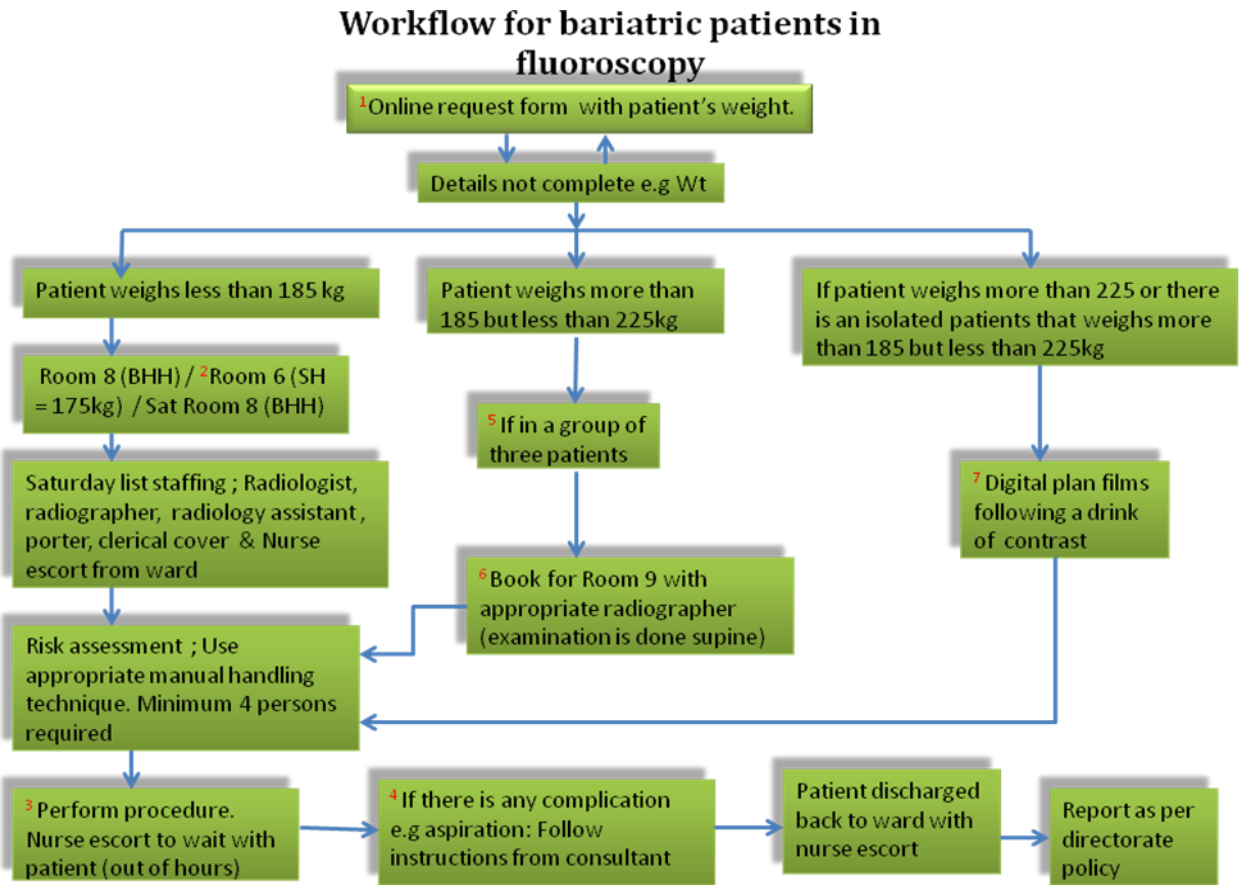
Investigation of reflux is only indicated where lifestyle changes and empirical therapy fail. While pH monitoring is the gold standard for reflux, endoscopy will reliably show early changes of reflux oesophagitis and allows detection and biopsy of metaplasia. Barium swallow examination may be indicated when pH monitoring is not readily available.

Dyspepsia

Endoscopy is the examination of choice. In patients >45 years barium meal should be considered if endoscopy is normal or refused.

Post operative

Water soluble swallows post oesophago-gastric resection or bariatric surgery. See workflow for bariatric patients in



STANDARD PROJECTIONS

Fluoroscopy/Spot Films as directed by radiologist or radiographer performing /supervising examination

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 2
AREA: CONTRAST FOLLOW THROUGH

VALID REASONS FOR EXAMINATION

Anatomical abnormality of small bowel:

Coeliac disease
Crohn's disease
Obstruction
? Small bowel tumours
? Small bowel mural abnormalities

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

Over couch film series:

As directed by Radiologist

ADDITIONAL PROJECTIONS

Fluoroscopy after over couch films as directed by supervising Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 3
AREA: CONTRAST ENEMA

VALID REASONS FOR EXAMINATION

?Large bowel obstruction
?Inflammatory bowel disease
Change in bowel habit
Bleeding PR
Lower abdominal pain
Post Operative Assessment
? Colonic Fistula or Leak
? malrotation - after discussion with Radiologist

NB: Water soluble enema may be performed at the discretion of the Radiologist in the following clinical conditions:

-post surgery
-? perforation
-?pseudomeconium ileus in paediatric patients

STANDARD PROJECTIONS

Fluoroscopy/Spot Films as directed by supervising Radiologist

ADDITIONAL PROJECTIONS

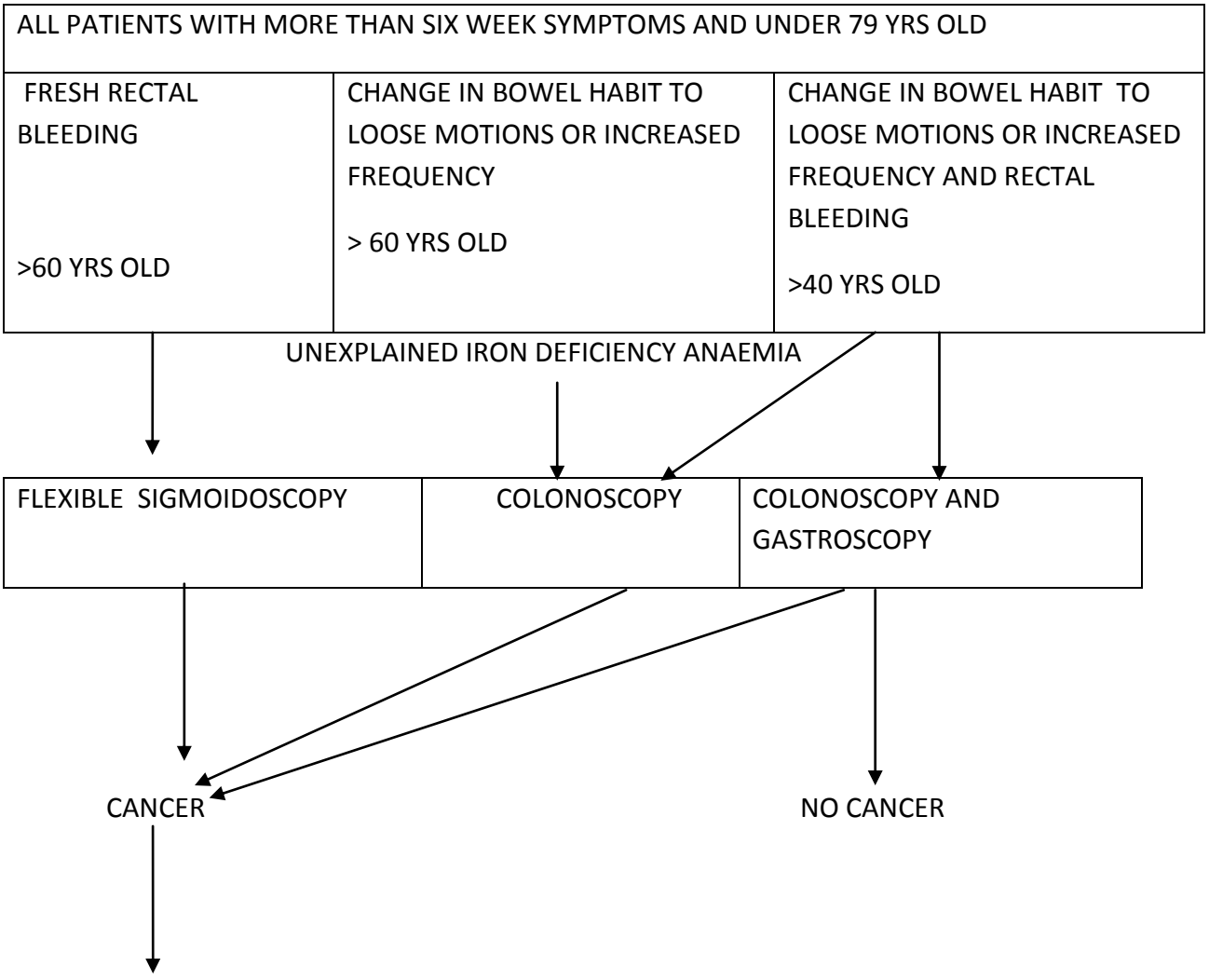
Over couch films: As per supervising Radiologist

DOSE REFERENCE LEVELS

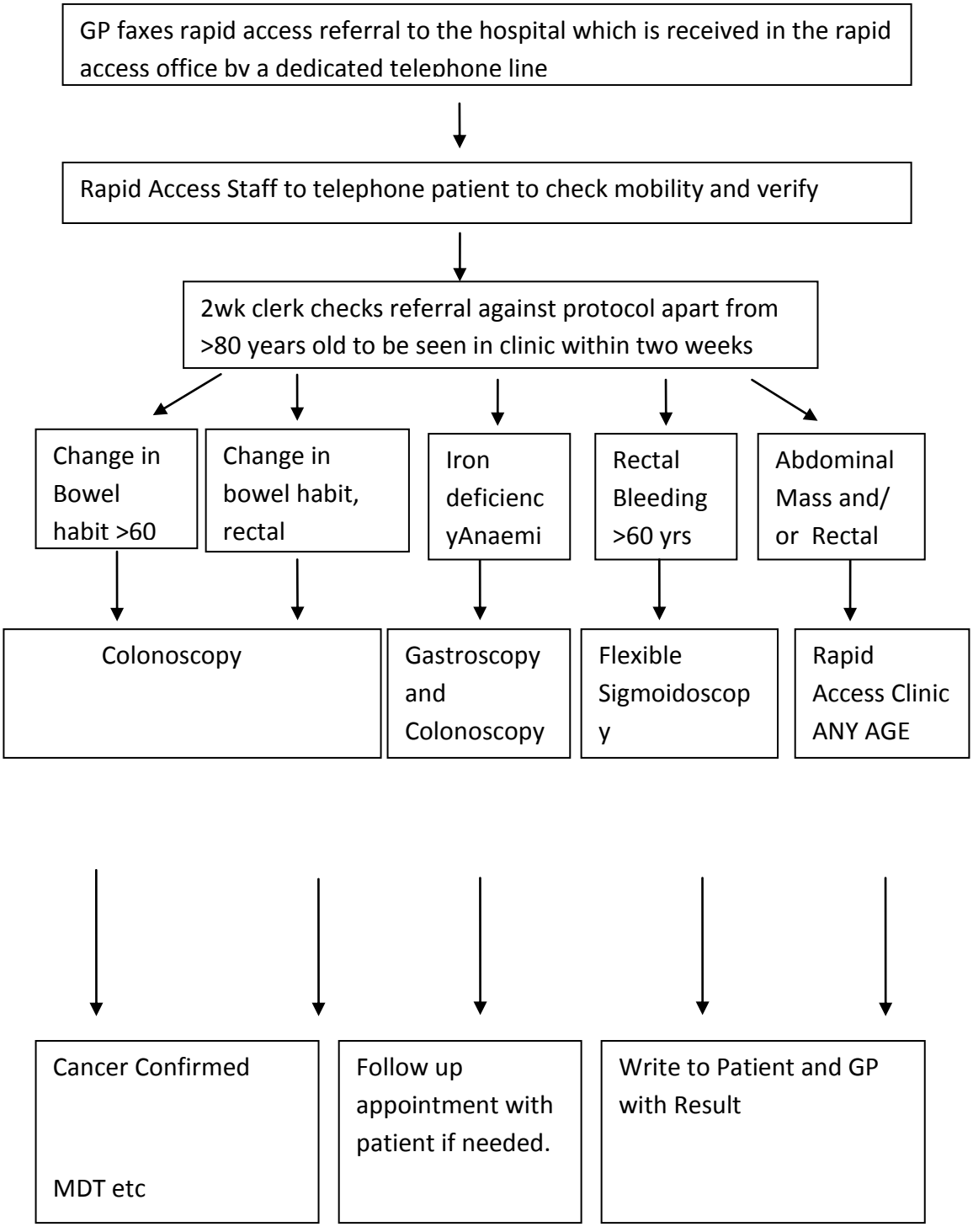
Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

For patients where there is a strong clinical suspicion of Colonic Malignancy, patients should be referred to the Rapid Access Colorectal Cancer Pathway-please see below



RAPID FAX BACK WITH DIAGNOSIS/APPROPRIATENESS OF REFERRAL


GP faxes rapid access referral to the hospital which is received in the rapid access office by a dedicated telephone line
Rapid Access Staff to telephone patient to check mobility and verify
2wk clerk checks referral against protocol apart from >80 years old to be seen in clinic within two weeks
Change in Bowel habit >60
Change in bowel habit, rectal
Iron deficiency Anaemi
Rectal Bleeding >60 yrs
Abdominal Mass and/ or Rectal
Colonoscopy
Gastroscopy and Colonoscopy
Flexible Sigmoidoscopy
Rapid Access Clinic ANY AGE
Cancer Confirmed
MDT etc
Follow up appointment with patient if needed.
Write to Patient and GP with Result

EXAMINATION PROTOCOL NO: 4

AREA: SMALL BOWEL ENEMA

VALID REASONS FOR EXAMINATION

Anatomical abnormality of small bowel:

Coeliac disease

Crohn's disease

?Obstruction

Intestinal blood loss: chronic or recurrent

? Small bowel tumours

? Mural abnormalities

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

Over couch films

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 5
AREA: GASTRIC BANDS

VALID REASONS FOR EXAMINATION

Adjustment of gastric band to aid weight loss following gastric banding surgery

STANDARD PROJECTIONS

Fluoroscopy / spot films

ADDITIONAL PROJECTIONS

Over couch films if required by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 6
AREA: HYSTEROSALPINGOGRAMS

VALID REASONS FOR EXAMINATION (following specialist referral)

Sub fertility

Patency of fallopian tubes

Recurrent abortions

?successful sterilisation

?congenital uterine anomaly

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 7
AREA: UROLOGY CASES –
RETROGRADES/ MICTURATING CYSTOGRAMS/ /URETHROGRAMS/ URODYNAMICS

VALID REASONS FOR EXAMINATION

RETROGRADES – After discussion with a radiologist (except if done in theatre)

Direct visualisation of ureters

Filling defects in the pelvi-ureteric system

Inadequate demonstration of pelvi-ureteric systems on IVU

?PUJ obstruction

MCUG

Proven UTI in children, ?reflux

Recurrent UTI in adults: to be discussed with Radiologist

Posterior urethral valves

?vesical leaks and fistulas

URETHROGRAMS

Urethral strictures

Trauma

Vesical leaks /fistulas

CYSTOGRAM

Post operative check for leak

Trauma

URODYNAMICS

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

Over couch films if required by the Radiologists

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 8
AREA: MYELOGRAMS

VALID REASONS FOR EXAMINATION

Myelograms will only be performed after discussion with Radiologist

Identify compression of thecal sac and its contents visualise the thecal linings and subarachnoid space in nerve root sleeves.

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

Over couch films if required by the Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 9
AREA: SINOGRAMS / FISTULOGRAMS

VALID REASONS FOR EXAMINATION

Visualisation of tract

Abscess

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 10
AREA: SIALOGRAMS – SUBMANDIBULAR/PAROTID

VALID REASONS FOR EXAMINATION

? Stones in salivary glands/ducts

? Duct stenosis

STANDARD PROJECTIONS

Fluoroscopy/Spot Films as per supervising Radiologist.

ADDITIONAL PROJECTIONS

Post Sialogram film at discretion of Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 11
AREA: ARTHROGRAM

VALID REASONS FOR EXAMINATION

Visualisation of joint movement

CDH

Glenoid or acetabular labral tears

Capsular tears

Usually performed in conjunction with an MRI scan.

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

At discretion of Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 12
AREA: HERNIOGRAMS

VALID REASONS FOR EXAMINATION

Unexplained groin pain - ? Hernia

Following discussion with a Consultant Radiologist

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 13
AREA: VIDEOFLUOROSCOPY

VALID REASONS FOR EXAMINATION

Swallowing disorders

Aspiration

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 14
AREA: LUMBAR PUNCTURE UNDER SCREENING CONTROL

VALID REASONS FOR EXAMINATION

Failed Lumbar puncture – after discussion with a radiologist

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 15
AREA: VIDEOPROCTOGRAPHY

VALID REASONS FOR EXAMINATION

Obstructive defacation

Pelvic floor prolapse

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 16
AREA: INJECTION OF TUBES

VALID REASONS FOR EXAMINATION

Assessment of the position of

-long lines

-Jejeunostomies

-naso- gastric tubes

-percutaneous gastrostomy tubes

STANDARD PROJECTIONS

Fluoroscopy/Spot Films

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 17
AREA: IVU

VALID REASONS FOR EXAMINATION

After discussion with Consultant Radiologist.

STANDARD PROJECTIONS

Control film – plain full length KUB

Immediate cross kidneys (If appropriate; for urinary diversion in the event of perforation or leak from kidney or ureter)

5 minute cross kidneys

10 minute cross kidneys

Show to supervising Radiologist and continue as instructed.

ADDITIONAL PROJECTIONS

As requested by radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 18
AREA: EMERGENCY IVU

VALID REASONS FOR EXAMINATION

No longer indicated

STANDARD PROJECTIONS

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 19
AREA: T TUBE CHOLANGIOGRAM

VALID REASONS FOR EXAMINATION

Identification of CBD calculi following Cholecystectomy

STANDARD PROJECTIONS

Fluoroscopy / spot films

ADDITIONAL PROJECTIONS

Delayed films for obstruction as required.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

INTERVENTIONAL/VASCULAR EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

These investigations should be requested following specialist clinical assessment.

N.B. Not all interventional procedures are included in this document therefore ,some interventional procedures may necessitate specific discussion with the interventional Radiologist prior to referral.

EXAMINATION PROTOCOL NO: 1
AREA: PERIPHERAL ANGIOGRAPHY

VALID REASONS FOR EXAMINATION

Peripheral vascular disease.

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

PA Pelvis to show bifurcation of aorta

Oblique views to show origin of internal iliac vessels

Overlapping PA views of entire lower limbs.

ADDITIONAL PROJECTIONS

Lateral foot views, other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 2
AREA: MESENTERIC ANGIOGRAPHY

VALID REASONS FOR EXAMINATION

Mesenteric angina

GI Bleeding

Investigation of suspected tumour or Meckel's Diverticulum

STANDARD PROJECTIONS

PA Aortogram

Lateral Aortogram

PA and oblique views, as directed by the Radiologist, after selective catheterisation of abdominal arteries.

ADDITIONAL PROJECTIONS

Other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 3
RE: ARCH AORTOGRAM

VALID REASONS FOR EXAMINATION

Assessment of carotid arteries

Suspected dissection (Spiral CT should be first line investigation)

As a prelude to other investigations or procedures such as selective upper limb angiography or bronchial embolisation

STANDARD PROJECTIONS

RAO and LAO obliques at 40 – 45o to show arch of aorta and the origins of the vessels of the neck to the bifurcation of the common carotid arteries.

ADDITIONAL PROJECTIONS

Other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

CONTRA INDICATIONS AND ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 4
AREA: SELECTIVE CAROTID ANGIOGRAPHY

VALID REASONS FOR EXAMINATION

Assessment of carotid stenosis (ultrasound is the first line investigation)

STANDARD PROJECTIONS

For each vessel:

LAO 30^{o}

PA

Lateral Skull

ADDITIONAL PROJECTIONS

Townes view of skull.

Other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 5
AREA: RENAL ANGIOGRAPHY

VALID REASONS FOR EXAMINATION

Assessment of renal artery stenosis

Renal tumour assessment

Renal trauma (possibly leading to embolisation)

STANDARD PROJECTIONS

PA and both obliques for Aortogram phase

Repeat for selective catheterisation of each renal artery as required by Radiologist

ADDITIONAL PROJECTIONS

Other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 6
AREA: PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAM (PTC)

VALID REASONS FOR EXAMINATION

Jaundice, obstruction of bile duct, hepatic carcinoma.

STANDARD PROJECTIONS

PA and obliques depending on individual anatomy of patient as directed by Radiologist

ADDITIONAL PROJECTIONS

Other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 7
AREA: PERCUTANEOUS NEPHROSTOMY

VALID REASONS FOR EXAMINATION

Obstructive Hydronephrosis

Pyelonephrosis

As a prelude to antegrade ureteric stenting when retrograde stenting by urologists by cystoscopy not possible

STANDARD PROJECTIONS

AP with patient prone and oblique views as required by Radiologist

ADDITIONAL PROJECTIONS

Other views as directed by Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 8
AREA: UTERINE ARTERY EMBOLISATION

VALID REASONS FOR EXAMINATION

Symptomatic Uterine Fibroids

Menorrhagia

Pressure Symptoms

STANDARD PROJECTIONS

PA pelvis to show bifurcation of aorta and internal iliac branches

ADDITIONAL PROJECTIONS

Occasionally oblique views to show origins of internal iliac vessels.

Additional views as directed by the radiologist

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Low dose screening

Frame grabs rather than exposures

Angiographic runs only occasionally required (as directed by radiologist)

EXAMINATION PROTOCOL NO: 9
AREA: VARICOCELE EMBOLISATION

VALID REASONS FOR EXAMINATION

Scrotal discomfort attributable to varicocele

Subfertility

STANDARD PROJECTIONS

PA abdomen to show renal vein and testicular vein

ADDITIONAL PROJECTIONS

As directed by radiologist

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Low dose screening

Frame grabs rather than exposures

Angiographic runs only occasionally required (as directed by radiologist)

EXAMINATION PROTOCOL NO: 10
AREA: I.V.C.FILTER INSERTION

VALID REASONS FOR EXAMINATION

Free Floating ileo-femoral / I.V.C. thrombus

Recurrent PE despite adequate anticoagulation

PE with contraindication to anticoagulation

STANDARD PROJECTIONS

PA abdomen to demonstrate iliac bifurcation and renal veins

ADDITIONAL PROJECTIONS

As directed by radiologist

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 11
AREA: FACET JOINT, EPIDURAL AND NERVE ROOT BLOCK SPINAL INJECTIONS

VALID REASONS FOR EXAMINATION

Sciatica

Spinal Fractures

Back Pain

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

PA views to demonstrate relevant vertebral body or joint space.

Oblique views

Lateral views

Other views as directed by radiologist

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 12
AREA: DACROCYSTOGRAM

VALID REASONS FOR EXAMINATION

Blocked tear ducts

Watery eyes

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

AP view of skull to demonstrate tear ducts to back of throat

Other views as directed by radiologist

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 13
AREA: TUNNELLED CENTRAL LINE / PICC LINE

VALID REASONS FOR EXAMINATION

Chemotherapy

Long term Antibiotics

TPN

Parenteral nutrition

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

AP Thorax to demonstrate line position

Other views as directed by radiologist

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 14
AREA: DIALYSIS CATHETER

VALID REASONS FOR EXAMINATION

Renal Failure

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

AP Thorax to demonstrate line position

Other views as directed by radiologist

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 15
AREA: FISTULOGRAM AND FITULOPASTRY

VALID REASONS FOR EXAMINATION

Fenal Failure

Dialysis

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

AP views of the upper limb

Oblique views of the upper limb

Other views as directed by radiologist

ADDITIONAL PROJECTIONS

As directed by the radiologist

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 16
AREA: SVC STENT

VALID REASONS FOR EXAMINATION

Vena Cava Obstruction

Thrombus in Vena Cava

As directed by Radiologist performing procedure.

STANDARD PROJECTIONS

AP Thorax

Obliques of thorax

Other views as directed by radiologist

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVEL

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

C.T. EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

IMPORTANT: CT is a high radiation dose technique and should not be used lightly. Inappropriate use of CT delays scans in those patients who need it most.

EXAMINATION PROTOCOL NO 1
AREA: CT BRAIN

VALID REASONS FOR EXAMINATION

Acute Stroke: our policy is to scan within 24 hours. MRI should be considered in considered in young patients with clinical symptoms/signs of stroke in the presence of a normal CT scan. In suspected posterior fossa stroke in patients with a normal CT and in whom it is important to demonstrate the site of the stroke lesion, MRI can also be considered following discussion with a Radiologist.

Patients where acute thrombolysis is being considered- ie patients presenting within 3 hours of the onset of symptoms require their scan and report ASAP (within 1 hour)

Transient Ischaemic Attack

Space-occupying lesion

Headache:acute, severe, ?Sub-arachnoid haemorrhage (SAH) . The clinical history is critical. SAH headache typically comes on in seconds, rarely in minutes and almost never over more than 5 minutes. CT may be negative in a small proportion of patients with SAH (1-2 %) and an LP should be performed on all patients in whom CT is negative.

Headache with focal neurological signs or pattern suggestive of raised intra-cranial pressure or with nausea and vomiting.

Headache:chronic. In the absence of focal features, imaging is not usually useful. The following features significantly raise the odds of finding a major abnormality on CT or MRI:

- recent onset and rapidly increasing frequency and severity,
- headache causing waking from sleep or worse in mornings,
- associated dizziness, lack of coordination, tingling or numbness.

Suspected intra-cranial haemorrhage: intra-cerebral, sub-dural and extra-dural haematoma

? Hydrocephalus ?shunt function

Seizures ?cause;although in adult epilepsy, MRI is the investigation of choice. CT may complement MRI in the characterisation of lesions eg calcification

Dementia ?cause

Suspected NAI injury (Following discussion with Radiologist)

? Congenital or hereditary abnormalities

Head injury

Criteria for CT scanning after head injury

Immediate scan:

- GCS of <13 at any time since the injury (irrespective of alcohol/drugs)
  [A patient who has had a brief loss of consciousness at the time of injury with full recovery maybe observed and reviewed by a senior ED doctor{.
- GCS of 13 or 14 at 2 hours after the injury (irrespective of alcohol/drugs)
- Suspected open or depressed skull fracture
- Suspected penetrating injury
- Suspected base of skull fracture
- Any localising signs or neurological deficit
- Seizure after head injury (irrespective of previous history of epilepsy)
- Coagulopathy and loss of consciousness/amnesia
- Dangerous mechanism of injury and loss of consciousness or amnesia

As soon as practicable scan BUT always within 8 hours of injury [CT at the discretion of senior ED doctor after an appropriate period of observation with neurological observations on CDU]:

- More than one episode of vomiting in adults
  [Vomiting alone is not a reliable predictor of intracranial injury in children – careful clinical assessment is required].

- Persisting symptoms (to include headache>8 hours, persistent vomiting)
- Age >65 providing that some loss of consciousness or amnesia has been experienced
- Any patient with a fracture on skull X-ray.

[Children <5 years may need a GA for CT scan]

CT may also be indicated for other reasons at the discretion of the radiologist and where MRI is not suitable or not tolerated.

Head Injury in Children up to the age of 15

CT requests needs to be made by a Senior (SPR or above) clinician experienced in assessing children.

Immediate CT scan requested in the following circumstances. If none of the below apply, no imaging is required.

- Witnessed loss of consciousness lasting > 5 minutes
- Amnesia (antegrade or retrograde lasting more than 5 minutes)
- Abnormal drowsiness
- 3 or more discrete episodes of vomiting
- Clinical suspicion of NAI
- Post traumatic seizure in the absence of a history of epilepsy
- Age > 1 year : GCS < 14 on assessment in ED
- Age < 1 year : GCS (paediatric) < 15 on assessment in ED
- Suspicion of open or depressed skull injury or tense fontanelle
- Any sign of basal skull fracture (haemotympanum, panda eyes, CSF fluid leak from ears or nose, battle sign)
- Focal neurological deficit
- Age < 1 year : presence of bruise, swelling or laceration > 5 cm on the head.

- Dangerous mechanism of injury (high speed RTA either as pedestrian, cyclist or vehicle occupant
- Fall from greater than 3 metres, high speed injury from a projectile or object)

THERE IS LITTLE OR NO ROLE FOR SKULL X RAYS IN CHILDREN. CONSIDERATION OF SKULL X RAYS IN CHILDREN SHOULD BE DISCUSSED WITH A CONSULTANT.

STANDARD PROJECTIONS

Trauma.

Thin slice axial 3 or 4mm continuous slices from base of skull to the vertex of the skull. Helical/volume scans to be performed dependent upon scanner, clinical indication and following discussion with Radiologist or Advanced Practitioner.

Standard (non trauma)

Thin slice 3 or 4mm continuous slices from base of skull to third ventricle then 6 or 8mm axial continuous scans to the vertex. Helical/volume scans to be performed dependent upon scanner, clinical indication and following discussion with Radiologist or Advanced Practitioner.

ADDITIONAL PROJECTIONS

Contrast scans as required

Base of skull- un-stacked images 2mm contiguous slices

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Helical acquisitions for major trauma

EXAMINATION PROTOCOL NO 2
AREA: CT SINUSES

VALID REASONS FOR EXAMINATION

?Chronic sinusitis/mucosal proliferation

?Nasal polyposis

? Malignancy assessment and follow up

Patients for landmark surgery

? CSF Leaks

STANDARD PROJECTIONS

Axial helical acquisition from top of frontal sinuses to base of maxillary sinuses with coronal and sagittal reconstructions. Volume acquisition on Aquilion One.

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 3
AREA: CT MASTOIDS/ PETROUS BONES

VALID REASONS FOR EXAMINATION

Middle or inner ear symptoms

Cholesteatoma or other neoplastic process

Acoustic neuroma- MRI is the investigation of choice but CT may be used when MRI unsuitable or not tolerated

Congenital abnormalities

Temporal bone lesion

Vertigo- MRI is the investigation of choice with CT confined to cases where MRI unsuitable and following discussion with a Radiologist.

STANDARD PROJECTIONS

0.5/0.75mm axial helical acquisition/ or volume acquisition. Scans reconstructed in coronal plane.

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 4
AREA: CT ORBITS

VALID REASONS FOR EXAMINATION

Acute visual field loss, visual disturbances: MRI is investigation of choice for suspected lesions of optic chiasm and CT is preferable for orbital lesions

Trauma

Suspected orbital tumours

Thyroid eye disease

Proptosis

Orbital inflammatory disease

Suspected foreign body: indicated when XR fails to show a strongly suspected foreign body or when it is not certain if a FB is intra-ocular.

STANDARD PROJECTIONS

0.5/0.75mm axial helical acquisition through the orbits angled along optic nerves with coronal reconstruction.

DOSE REFERENCE LEVELS

ADDITIONAL INFORMATION

Coronal MPRs should be sent to PACS as routine

Thyroid eye disease, FB and trauma-no IV contrast required..

IV contrast for ? tumour or infection

EXAMINATION PROTOCOL NO 5
AREA: CT NECK

VALID REASONS FOR EXAMINATION

Benign/malignant neoplastic disorders

Acute/chronic inflammatory disorders

Neck mass of unknown origin, if ultrasound undiagnostic

To assess association of blood vessels and nerves

To assess lesion if surgery is being considered

NB For any suspected Thyroid abnormality ultrasound should be the first line of assessment except in the case of acute airway obstruction.

STANDARD PROJECTIONS

Axial Helical acquisition from base of skull to carina

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

If the scan is being performed for staging of neck malignancy, extend scan from base of skull to lung bases.

EXAMINATION PROTOCOL NO 6
AREA: CT THORAX

Indications for CT Scanning

Standard Thoracic CT

Abnormal chest radiograph suggestive of intra-thoracic tumour or other significant pathology such as an aortic aneurysm, pulmonary vascular anomalies etc.

Strong clinical suspicion of significant pathology e.g. dissecting aneurysm.

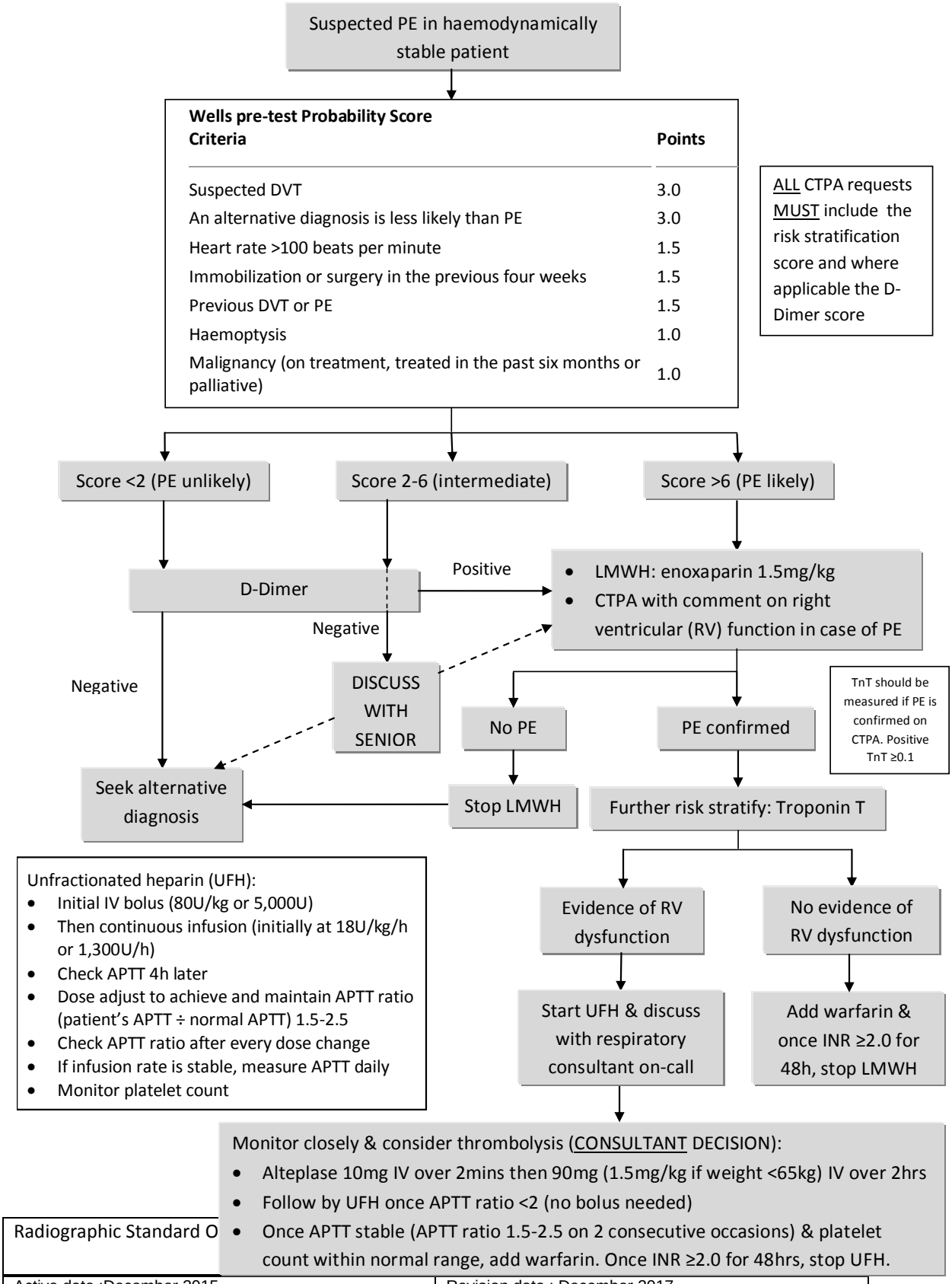
Staging of malignant diseases, either intrathoracic (eg. lung cancer) or extrathoracic (eg. renal carcinoma) or both (eg. lymphoma). Suspected tumour recurrence following thoracic surgery.

Major trauma.

Intrathoracic sepsis such as mediastinal abscess or empyema.

Suspected pulmonary embolism, if chest x-ray abnormal. If CXR normal then isotope V/Q scanning should still be the initial investigation. Requests for a CT pulmonary Angiogram will only be accepted in line with PE protocol, following a Positive D Dimer test and Wells score assessment. See flow chart below.

Suspected Pulmonary Embolism in Haemodynamically Stable Patients (Systolic BP >90mmHg)



Assessment of trachea and main bronchi – stenoses, tracheomalacia etc.

Please note- High resolution images are obtained in a standard CT scan of the Thorax.

High Resolution CT

Suspected diffuse or interstitial lung disease, based on clinical, lung function or chest x-ray findings.

Suspected bronchiectasis – persistent productive cough with purulent sputum. Such scans should not be requested in cases with symptoms of COPD only.

Suspected bronchiolar/small airway disease, based on clinical or lung function findings.

Assessment of emphysema if lung volume reduction surgery is being seriously considered.

Haemoptysis of unknown cause.

Pre and post-operative assessment of heart-lung transplant.

Follow up of suspicious lung nodules based on the Fleischner society guidelines-

Nodule Size (mm)*	Low-Risk Patient†	High-Risk Patient‡
≤4	No follow-up needed§	Follow-up CT at 12 mo; if unchanged, no further follow-up‖
>4–6	Follow-up CT at 12 mo; if unchanged, no further follow-up‖	Initial follow-up CT at 6–12 mo then at 18–24 mo if no change‖
>6–8	Initial follow-up CT at 6–12 mo then at 18–24 mo if no change	Initial follow-up CT at 3–6 mo then at 9–12 and 24 mo if no change
>8	Follow-up CT at around 3, 9, and 24 mo, dynamic contrast-enhanced CT, PET, and/or biopsy	Same as for low-risk patient

General Points

CT is a high radiation dose technique and should not be used lightly. Inappropriate use of CT cause delays scans in those patients who need it most.

In cases where a chest x-ray is only equivocally abnormal an opinion should be sought from a radiologist in the first instance prior to requesting CT.

In the case of in-patients who have only had an AP film, CT should not be requested until a departmental PA film has been performed.

STANDARD PROJECTIONS

1.Axial Helical acquisition from apices of lung to bases of lung fields in pulmonary arterial phase of contrast enhancement.

2. If scan looking for or staging lung/other thoracic malignancy a scan of liver in Portal Venous phase is also routinely performed

3 HRCT-

a) 1or 2mm helical volume acquisition

b) S&V- axial 1mm/2mm with 10 mm increments supine and 1mm/2mm with 20 mm increments in selected patients based on agreement with a Radiologist.

The choice of protocol depends on clinical indications and age and clinical condition of patient

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 7
AREA: CT ABDOMEN

VALID REASONS FOR EXAMINATION

Abdomen (general)

Urgent CT of the abdomen should be considered for patients with an acute abdomen where there exists uncertainty over the diagnosis and where the examination will influence the decision to operate. The surgical team should be involved in this decision. All requests for cross sectional imaging (elective or emergency) MUST be discussed with the relevant responsible consultant surgeon or the consultant on-call before a request is made as per General Surgical Directorate protocol. Urgent CT of the abdomen should be considered in the following:

Suspected leaking or dissecting aortic aneurysms if the patient is haemodynamically stable.

Mass in abdomen

Abdominal sepsis/pyrexia of unknown origin

Diagnosis, staging and follow-up of intra-abdominal and pelvic tumours

Acute abdominal pain: suspected perforation/obstruction-CT indicated for small sealed perforations and establishing the site and cause of obstruction (this does not apply to acute abdominal pain in children)

Small bowel obstruction: acute and chronic

Abdominal trauma patients who are haemodynamically stable

Suspected retro-peritoneal haemorrhage if the patient has features suggestive of significant continuous bleeding where the result of the scan will lead to a change in clinical management.

Abdomen (liver)

Assessment of Liver metastases (If metastases are demonstrated on one modality there is no indication for referral to another modality to validate diagnosis unless the result will change management)

Diagnosis of liver mass

Assessment of complications of chronic liver disease

Liver sepsis-abscess/biliary sepsis

Trauma

As part of staging for malignancy/diagnosis of malignancy

Abdomen GI Protocol

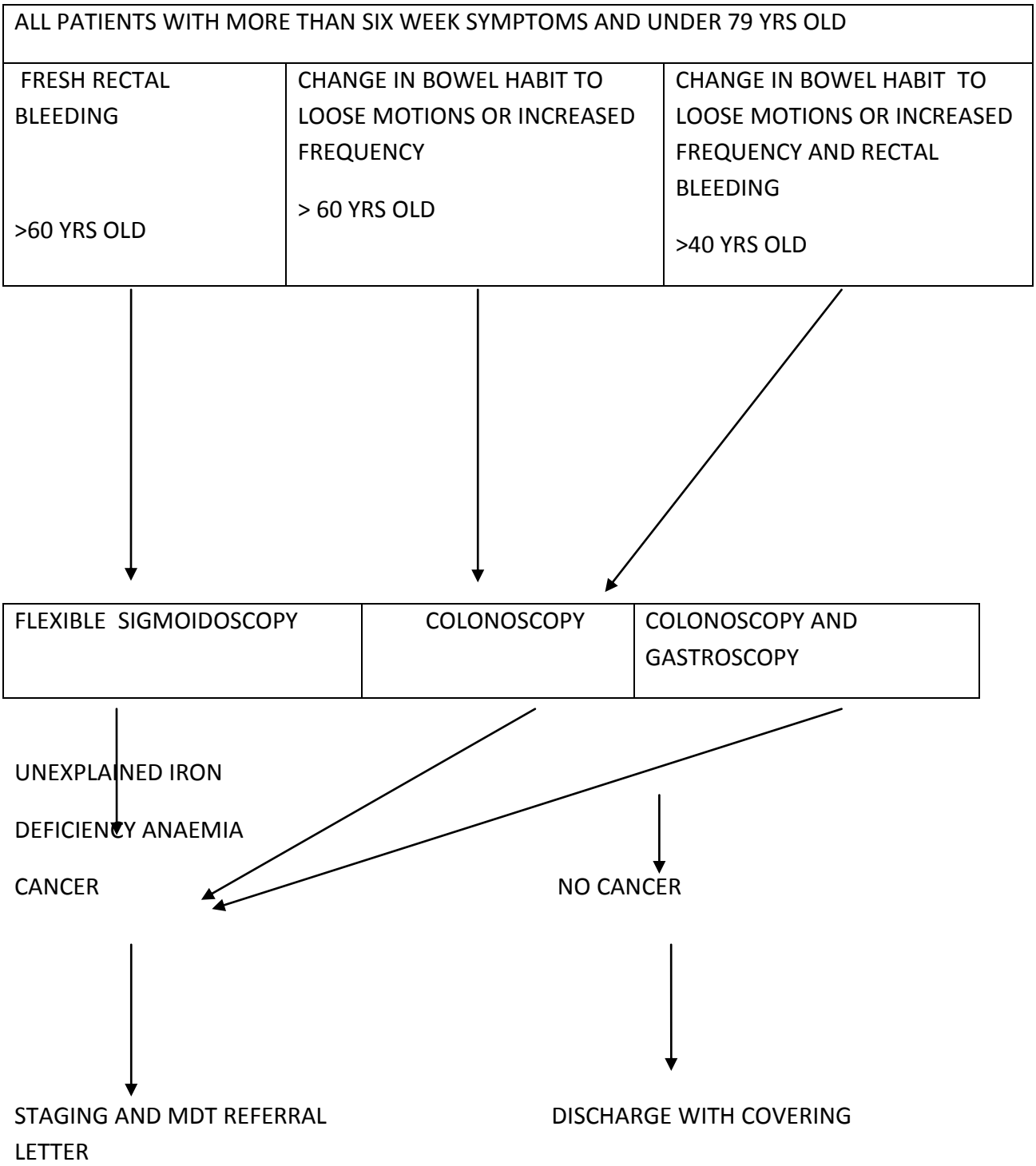
Where the full extent of alimentary tract needs to be visualised

Suspected colonic malignancy-As an alternative to barium enema or VC (virtual colonoscopy) in frail patients over the age of 70 years or younger patients in a clinically frail condition.

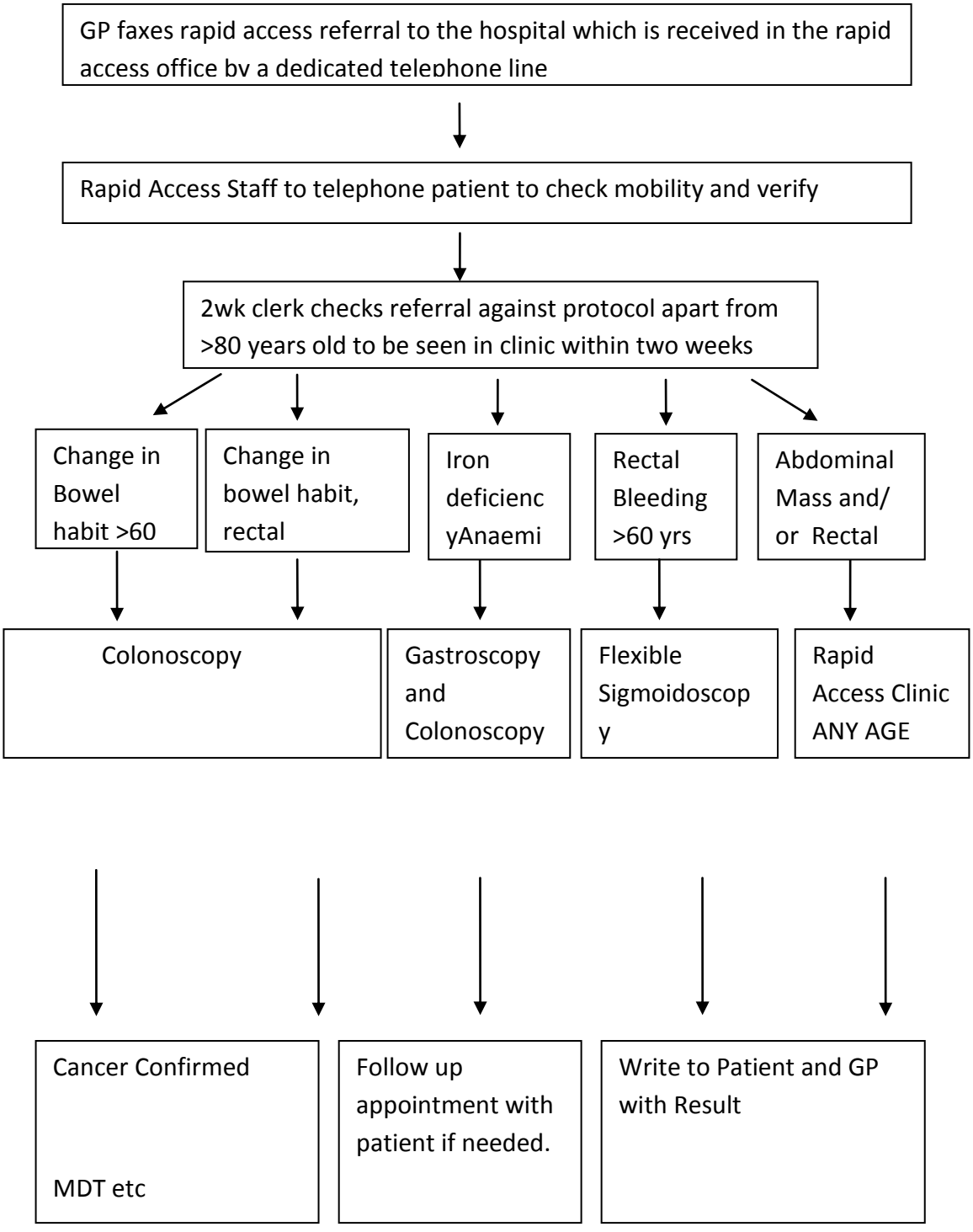
Iron deficiency anaemia- : Ideally, upper GI Endoscopy and Sigmoidoscopy/Colonoscopy should be performed prior to CT

Figure 4

Current version of straight to test



RAPID FAX BACK WITH DIAGNOSIS/APPROPRIATENESS OF REFERRAL


GP faxes rapid access referral to the hospital which is received in the rapid access office by a dedicated telephone line
Rapid Access Staff to telephone patient to check mobility and verify
2wk clerk checks referral against protocol apart from >80 years old to be seen in clinic within two weeks
Change in Bowel habit >60
Change in bowel habit, rectal
Iron deficiency Anaemi
Rectal Bleeding >60 yrs
Abdominal Mass and/ or Rectal
Colonoscopy
Gastroscopy and Colonoscopy
Flexible Sigmoidoscopy
Rapid Access Clinic ANY AGE
Cancer Confirmed
MDT etc
Follow up appointment with patient if needed.
Write to Patient and GP with Result

CT Colonography

Suspected colonic malignancy. (see above)

Abdomen (Urology-Urogram)

Haematuria- following cystoscopy and ultrasound scan in selected patients- please refer to flow diagram.

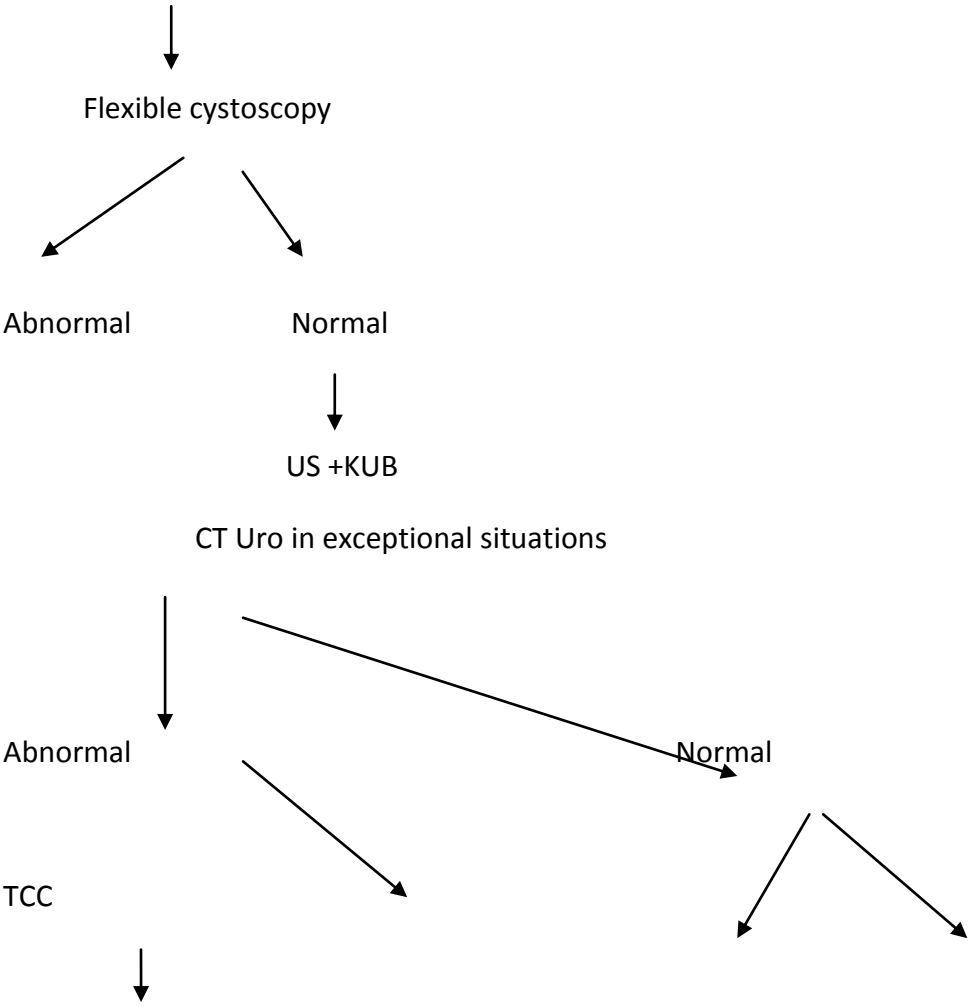
PROTOCOL FOR INVESTIGATION OF HAEMATURIA

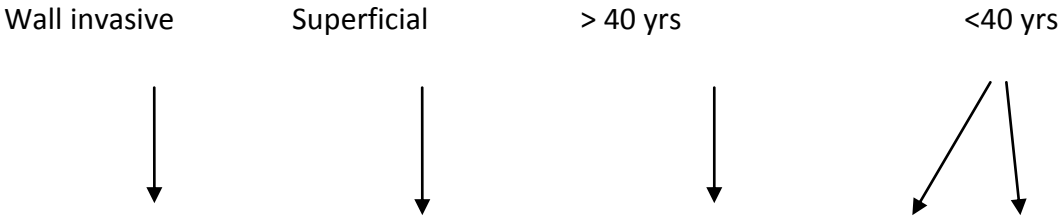
Macrohaematuria Persisitent significant

(Rapid access) microhaematuria (via OP)

Or

Microhaematuria with high risk factors





Bladder / prostate neoplasm (staging)

Staging/assessment of renal tumours (with CT scan of thorax)

CT KUB for suspected acute renal colic- acute onset severe unilateral loin to groin pain with associated haematuria. For females < 30 this investigation will need to be discussed and agreed by a Consultant Radiologist.

Abdomen (Aneurysm)

? Leaking abdominal aortic aneurysm if the patient is haemodynamically stable.

To assess size and extent pre stenting or surgery

Post stenting

Pancreas

Acute pancreatitis e.g to assess necrosis/abscess

Chronic pancreatitis

Staging of pancreatic tumours

STANDARD PROJECTIONS

Axial helical acquisition from dome of diaphragms to symphysis pubis.

ADDITIONAL PROJECTIONS

Plain,arterial, portal venous and delayed projections

Pre contrast depending on clinical indications.

Limited acquisitions from diaphragm to Iliac crests

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 8
AREA: CT EXTREMITIES

VALID REASONS FOR EXAMINATION

Trauma for clarification of fracture position where plain films are equivocal

? Tumour (MRI may be more appropriate)

? Infection(MRI may be more appropriate)

?non-union

STANDARD PROJECTIONS

Axial 0.5mm/0.75mm helical acquisition through extremity/region of interest.
0.5mm volume acquisition on Aquilion One where appropriate.

Coronal and saggital reconstructions as appropriate.

ADDITIONAL PROJECTIONS

EXAMINATION PROTOCOL NO 9
AREA: CT /MR ARTHROGRAPHY

VALID REASONS FOR EXAMINATION

Shoulder:- recurrent dislocation with suspected labral or ligamentous injury

Elbow:- restricted joint movement

suspected loose body

Wrist : -suspected ligamentous or cartilage injury

Hip: - suspected labral injury

EXAMINATION PROTOCOL NO 10
AREA: CT LEG LENGTH/PELVIMETRY

VALID REASONS FOR EXAMINATION -LEG LENGTH

Accurate leg length measurement referred from orthopaedic surgeon

VALID REASONS FOR EXAMINATION -PEVIMETRY

Accurate measurement of pelvic inlet/outlet post partum or occasionally pre partum, at request of consultant gynaecologist

NB :SCANOGRAM ONLY PERFORMED AS PER CT PROTOCOL

EXAMINATION PROTOCOL NO 11
AREA CT CERVICAL, THORACIC AND LUMBAR SPINE

VALID REASONS FOR EXAMINATION

Cervical spine Trauma

Abnormal and/or poorly visualised areas on C spine radiographs, request must be made by middle grade/consultant.

After midnight: If the mechanism is minor or in cases where the clinical suspicion is low, CT scanning can be delayed until the next morning. The patient will require immobilisation in an Aspen or rigid collar at the discretion of the senior Emergency Physician

Unconscious or obtunded patient with potential (mechanism) or confirmed cervical spine injury ***AND*** has clinical indication for CT scan of any other body area

Unconscious or obtunded patient with potential or confirmed cervical spine injury WITH NO clinical indication for CT scan of any other body area should first have a radiographic cervical spine survey and only proceed to CT if abnormal and/or poorly visualised areas on C spine radiographs

Other reasons may be considered at the discretion of the radiologist for example where MRI is not tolerated

EXAMINATION PROTOCOL NO 12
AREA: CT ANGIOGRAPHY/VENOGRAPHY

VALID REASONS FOR EXAMINATION

Aortic angiography:	? Leaking aortic aneurysm if the patient is haemodynamically stable.
	To assess size and extent pre stenting or surgery
	Post stenting
	?Dissection
Peripheral Angiography-	Intermittent claudication
	Peripheral Vascular Disease
	Limb Ischaemia
	Arteriovenous fistula
Renal Angiography-	Renal artery stenosis
	Renal transplant donor
Mesenteric Angiography	Bowel Ischaemia
	GI Bleeding
Carotid Angiography-	Assessment of carotid arteries
	Assessment of subclavian arteries
Circle of Willis-	?aneurysm

Cranial angiography	?Arteriovenous malformation
	?aneurysm
Cranial venography	Venous sinus thrombosis
Cerebral perfusion	Acute stroke for thrombolysis – must be discussed with Radiologist
Abdominal venography	?Extent of proximal DVT

STANDARD PROJECTIONS

Axial 0.5mm/0.75mm/1mm/1.5mm helical acquisition through area of interest (volume acquisition on Aquilion One if appropriate)

From:

Carotid angiogram (aortic arch to circle of Willis)

Thoracic aorta angiogram(lower neck to renal arteries)

Thoracic aorta ?dissection(uncontrasted thorax + contrasted lower neck to aortic bifurcation)

Abdominal aorta angiogram (diaphragm to femoral arteries)

Peripheral angiogram (diaphragm to feet)

Whole aorta (above aortic arch to femoral arteries)

Whole aorta and peripheral circulation (aortic arch to feet)

Renal angiogram (renal arteries and both kidneys)

Mesenteric angiogram for acute bleed (abdomen and pelvis uncontrasted+ abdomen and pelvis arterial 40secs + abdomen and pelvis at 90sec venous)

Mesenteric angio ischaemia (abdomen and pelvis arterial + abdomen and pelvis 70sec venous)

Cranial angiography (arterial -base of skull to vertex)

Cranial venography (venous -base of skull to vertex)

Cerebral perfusion (dynamic volume scans in uncontrasted, arterial and venous phases -base of skull to vertex)

Abdominal venography (abdomen and pelvis venous)

ADDITIONAL PROJECTIONS

Limited scans through areas of interest

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 13
AREA: CT CARDIAC

VALID REASONS FOR EXAMINATION

Consultant referral only.

All referrals must have been discussed with a Cardiologist and that Cardiologists name should appear on the referral so that an urgent report can be directed to them.

Acute coronary syndrome for coronary artery disease assessment

Coronary artery disease assessment

Identifying obstructive coronary artery disease
- Chest pain possibly due to angina
- Equivocal stress test
- New onset heart failure

Identifying suspected coronary artery anomalies
Assessing a cardiac mass
Defining pulmonary artery anatomy prior to ablation
Coronary vein mapping prior to pacemaker placement

Assessment of bypass grafts

Stent evaluation

Dissection

Functional analysis

STANDARD PROJECTIONS

From:

Calcium score (uncontrasted cardiac gated volume acquisition through heart)

Coronary angiogram(contrasted cardiac gated volume acquisition through heart)

Coronary angiogram(contrasted cardiac gated volume acquisition through heart with functional analysis)

Bypass graft assessment (helical contrasted acquisition through vessels of interest and heart)

Bypass graft assessment (helical contrasted acquisition through vessels of interest and heart with functional analysis)

Coronary angiogram(contrasted cardiac gated volume acquisition through heart and contrasted thorax)

ADDITIONAL PROJECTIONS

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Poor images are usually associated with patients who:

1) We can't give B Blockers to – i.e. Asthmatics, Heart Failure, Heart Block

2) Very High BMI >36

Potentially able to scan these groups with very strong indications but discussion with a consultant radiologist is essential.

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

MAMMOGRAPHY EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

EXAMINATION PROTOCOL NO: 1
AREA: BREAST

In most cases patients should be referred for specialist clinical assessment prior to any radiological imaging. Please refer to local Breast Imaging Guidelines site specific for Good Hope and Solihull.

VALID REASONS FOR EXAMINATION

Palpable lump
Skin changes
Nipple inversion/discolouration
Family history (after appropriate risk assessment)
Asymmetric/breast tenderness
Previous surgery for breast cancer
History of treatment for Hodgkinson disease

STANDARD PROJECTIONS

Both medio-lateral obliques

Both cranio-caudal views

ADDITIONAL PROJECTIONS

Both laterals

Magnification/paddle views

At the discretion of the Radiologist according to symptoms

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

GP requests not routinely accepted please refer to a breast radiologist for further discussion.

EXAMINATION PROTOCOL NO: 2
AREA: BREAST: STEREOTATIC LOCALISATION

VALID REASONS FOR EXAMINATION

Impalpable lesions requiring pre operative localization prior to surgical excision.

Lesions best seen on mammographic views compared to ultrasound requiring excision.

STANDARD PROJECTIONS

Scout and 15 degree angle paired views to demonstrate area to be localized.

15 degree angle paired views to demonstrate accurate placement of wire prior to deployment.

Check ML and CC mammograms.

ADDITIONAL PROJECTIONS

At the discretion of the Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 3
AREA: BREAST: STEREOTATIC CLIP MARKING

VALID REASONS FOR EXAMINATION

Lesions requiring insertion of radio-opaque marker prior to neoadjuvant chemotherapy for mammographic lesions not see on ultrasound.

To facilitate future localization of a lesion following stereotactic biopsy e.g. if all elements of microcalcification removed during diagnostic biopsy.

STANDARD PROJECTIONS

Scout and 15 degree angle paired views to demonstrate area to be marked with clip.

15 degree angle paired views to demonstrate accurate placement of clip prior to deployment.

Check ML and CC mammograms.

ADDITIONAL PROJECTIONS

At the discretion of the Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 4
AREA: BREAST: STEREOTATIC CLIP MARKING

VALID REASONS FOR EXAMINATION

To obtain histological specimens for:

- Impalpable lesions see on mammography
- Lesions not amenable to clinical or ultrasound guided biopsy

STANDARD PROJECTIONS

Scout and 15 degree angle paired views to demonstrate area to be sampled.

15 degree angle paired views with biopsy device in situ to demonstrate accurate targeting of lesion prior to commencing sampling.

ADDITIONAL PROJECTIONS

For stereotactic biopsies performed for microcalcification, specimen imaging required to demonstrate the retrieval of samples containing microcalcifcation.

At the discretion of the Radiologist

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

DENTAL EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

EXAMINATION PROTOCOL NO: 1
AREA: OPG

VALID REASONS FOR EXAMINATION

? Fracture mandible/ facial trauma

Periocerioconitis / third molar assessment

Pre extraction assessment

Trigeminal neuralgia and atypical facial pain (to exclude dento-alveolar / antral disease)

For generalised irregular bone loss in periodontal disease (in conjunction with selected periapicals)

Grossly neglected dentition with multiple grossly carious teeth and roots

Heavily restored dentition, history of multiquadrant endodontic treatment

Unerrupted teeth

Patients who cannot tolerate intra-aural radiography

TMJ assessment

Dental trauma

Retained roots

Impacted wisdom teeth

Bone loss prior to implant surgery

Orthodontic assessment

Acute facial swelling with restricted mouth opening

STANDARD PROJECTIONS

OPG

ADDITIONAL PROJECTIONS

Lateral cephalostat if indicated

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 2
AREA: LATERAL CEPHALOSTAT

VALID REASONS FOR EXAMINATION

Prior to and during orthodontic assessment prior to surgery

STANDARD PROJECTIONS

Lateral facial bones to include soft tissue and additional measurements. (Teeth should be in occlusion.)

ADDITIONAL PROJECTIONS

OPG

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO: 3
AREA: OCCLUSAL FILM

VALID REASONS FOR EXAMINATION

? Submandibular gland stones

Fracture of mandible

Unerupted teeth

Supernumerary teeth

STANDARD PROJECTIONS

Film is placed in mouth with emulsion side down. Film must be positioned offset to the side of interest as much as possible.

Teeth closed gently around the film.

Head positioned into SMV position.

Centre under the chin offset to side of interest.

ADDITIONAL PROJECTIONS

Tongue depressed lateral

Lateral oblique mandible

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27

ADDITIONAL INFORMATION

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

BONE DENSITOMETRY EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

EXAMINATION PROTOCOL NO: 1
AREA: DEXA LUMBAR SPINE, BOTH HIPS

VALID REASONS FOR EXAMINATION

- Osteopaenia or osteoporotic changes on x-ray
- Long standing steroid use
- Premature menopause
- Amenorrhoea
- Rheumatoid arthritis
- Immobilising disorder
- Male hypogonadism
- Chronic renal or liver disease
- Excess alcohol
- Strong family history of osteoporosis
- Monitoring of treatment for osteoporosis
- Rarer medical disorders associated with this condition
- On arimadex for breast cancer
- Malabsorption
- Cystic Fibrosis
- Fragility Fractures

STANDARD PROJECTIONS

AP Lumbar Spine

AP Both hips

ADDITIONAL PROJECTIONS

If pt has a total hip replacement, do not scan that hip

Forearm-PA view-can be done as an alternative to the standard examination if the patient cannot get on the bed, or if the patient has metal work in both hips and spine, or if LMP dates cannot be established.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

Yearly scans are performed for patients on Arimadex or with Cystic Fibrosis

Dual energy vertebral assessment (DVA) is performed at the request of Dr Helen Chamberlain.

RADIOGRAPHIC STANDARD OPERATING PROTOCOLS

CARDIOLOGY EXAMINATIONS

PRODUCED IN ACCORDANCE WITH THE ROYAL COLLEGE OF RADIOLOGISTS GUIDELINES (1998) AND DEPARTMENT PROTOCOLS.

EXAMINATION PROTOCOL NO 1
AREA: DIAGNOSTIC CORONARY ANGIOGRAPHY

VALID REASONS FOR EXAMINATION

Angina (or angina equivalent)

Myocardial infarction

Work up for valve surgery or valvuloplasty

Heart failure of uncertain causes

Cardiac risk assessment for general/ vascular/ thoracic surgery as part of research protocol

STANDARD PROJECTIONS

1 Selective left coronary artery.

Obtained with 17cm II. 15fps acquisition. Hand injection 10 Niopam 340

Normal Projections	Additional projections at discretion of cardiologist including:
30° RAO	50° LAO, 20° Caudal 'spider'
30° RAO, 20° Caudal	20° LAO, 20° Caudal
30° RAO, 20° Cranial	Lateral
50° LAO	PA, 20° Cranial
50° LAO, 20° Cranial	PA, 20° Caudal
	RAO 45°

2 Selective right coronary artery

Obtained with 17cm II. 15fps acquisition. Hand injection 10 Niopam 340

Normal Projections	Additional projections at discretion of cardiologist including:
45° LAO 35° RAO	20° LAO, 20° Caudal 20° LAO, 20° Cranial

3 Left Ventricular Angiogram

Obtained with 20cms II. 15fps acquisition. Medrad pump injection 35mls @ 15mls/sec 950psi Niopam 340 at 30° RAO

ADDITIONAL PROJECTIONS

4 Additional projections

Aortogram: 40° LAO 15 fps acquisition, 20cms II. Medrad pump injection 40mls @ 20mls/sec 950psi Niopam 340.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 2
AREA: RIGHT HEART CATHETER +/- RV BIOPSY

VALID REASONS FOR EXAMINATION

Assessment of unexplained breathlessness

Assessment of right heart pressures in the context of valvular heart disease or left ventricular dysfunction, assessment of cardiac shunts.

Assessment of possible pericardial disease.

Assessment of heart failure of uncertain cause.

Work up for heart/lung transplantation.

STANDARD PROJECTIONS

Screening only in PA position – 20 cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 3
AREA: CORONARY ANGIOPLASTY

VALID REASONS FOR EXAMINATION

Treatment of patients with symptomatic, stable angina (or angina equivalent),
Treatment of patients with recent acute coronary syndrome

Treatment of patients with acute myocardial infarction as primary or rescue procedure.

STANDARD PROJECTIONS

As indicated from diagnostic procedure. 17cm II 15 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 4
AREA: VALVULOPLASTY

VALID REASONS FOR EXAMINATION

Treatment of patients with stenosed valves of symptomatic or haemodynamic significance.

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 5
AREA: PERICARDIOCENTESIS

VALID REASONS FOR EXAMINATION

Drainage of pericardial fluid to relieve pericardial tamponade, diagnostic pericardiocentesis

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 6
AREA: TEMPORARY AND PERMANENT PACEMAKER INSERTION

VALID REASONS FOR EXAMINATION

Temporary or permanent cardiac conduction abnormalities causing symptoms, risk of symptoms, haemodynamic disturbance, risk of haemodynamic disturbance

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 7
AREA: INTERNAL CARDIOVERSION

VALID REASONS FOR EXAMINATION

Treatment of Atrial fibrillation in patients where external Cardioversion has failed or large patients where external Cardioversion is deemed unlikely to be effective.

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 8
AREA: INTRA VASCULAR ULTRASOUND (IVUS) OR OPTICAL COHERENCE TOMOGRAPHY (OCT)

VALID REASONS FOR EXAMINATION

IVUS or OCT is used in conjunction with angiography/ angioplasty to assess the internal characteristics of the coronary arteries. It may be used to assess stenosis, presence of thrombus, calcification and to ensure optimal stent deployment

STANDARD PROJECTIONS

Screening only in projections indicated from coronary angiography that best display position of the probe in the target vessel.

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 9
AREA: INTRA AORTIC BALLOON PUMP (IABP) INSERTION

VALID REASONS FOR EXAMINATION

Cardiogenic shock

To augment coronary perfusion either during high risk PCI or for patients with severe triple vessel disease awaiting emergency bypass surgery.

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 10
AREA: IMPLANTABLE CARDIOVERTER DEFIBRILATOR (ICD) INSERTION

VALID REASONS FOR EXAMINATION

To treat abnormally fast heart beat arising from the lower chambers of the heart in patients with a history of previous myocardial infarction and reduced ejection fraction

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

EXAMINATION PROTOCOL NO 11
AREA: BIVENTRICULAR PERMENENT PACEMAKER INSERTION

VALID REASONS FOR EXAMINATION

for cardiac resynchronization therapy in heart failure patients

STANDARD PROJECTIONS

Screening only in PA position 20cm II 7.5 fps

DOSE REFERENCE LEVELS

Please refer to National and Local DRL's in Appendix 27.

ADDITIONAL INFORMATION

NUCLEAR MEDICINE
STANDARD OPERATING PROTOCOLS

Clinical Director: Dr J Reynolds

Date: December 2015

Review Date: December 2017

RADIONUCLIDE STATIC RENAL IMAGING

Examinations :

DMSA Static renal images
Valid reasons for performing this examination:

- UTI.
- Reflux.
- Pyelonephritis.
- Relative renal function.
- Renal trauma.
- Position and anatomy of kidneys.

Standard Views.

Posterior

Left Posterior Oblique

Right Posterior Oblique

*Anterior/anterior Oblique

*denotes an optional view to be performed only when necessary.

Radiation dose

1Effective Dose = 0.7 mSv for 80 MBq 99mTc DMSA.

1Source - ARSAC

Children's dosage calculated according to body weight.

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with DMSA and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE DYNAMIC RENAL IMAGING

Examinations :

Renogram using either MAG3 or DTPA
Valid reasons for performing the examination.

- Suspected obstruction.
- Loin pain.
- ?Relative Function.
- Suspected renal artery stenosis.
- Suspected reflux.
- Post operative.
- Dilated collecting systems.

Standard Views.

Supine:

A 30 -40 minute dynamic phase is collected together with sixteen static frames. If assessment of obstruction the patient should be given 20mg Frusemide IV1.

Optional view- After collection of the dynamic phase the patient is repositioned so that the bladder is included in the field of view, and a single static frame is acquired. The patient must then empty their bladder2.

A further static image is acquired of the kidneys/bladder (post micturition) in an upright position ***unless a micturition study or a captopril study is being performed. (see below)***

Optional Studies

a) F-15 (assessment of equivocal obstruction). Frusemide is given 15 minutes before commencement of the study

b) A Dynamic micturition study acquired when the patient is voiding can detect the presence of urinary reflux.

c) A renogram together with dosage images acquired before and after administration of DTPA can give an estimation of glomerular filtration rate (GFR). This can be combined with pre administration of 20 mg Captopril orally to detect renal artery stenosis.

Radiation dose

Please refer to National and Local DRL's in Appendix 27.

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Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with DTPA/MAG3 and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE LUNG IMAGING

Examinations :

VQ (Ventilation/Perfusion) lung scan and perfusion lung scan
Valid reasons for performing the examination.

- Suspected pulmonary embolus.
- Quantitative Lung assessment

Standard Views.

Anterior Perfusion

Anterior Ventilation

Posterior Perfusion

Posterior Ventilation

Right Posterior Oblique Perfusion

Right Posterior Oblique Ventilation

Left Posterior Oblique Perfusion

Left Posterior Oblique Ventilation

Please Note: Anterior oblique images may be substituted for posterior oblique images if the patient is bed bound and cannot be moved to the imaging table.

Radiation dose.

The patient receives 100 78 MBq of 99mTc MAA + 81mKr gas.

*Estimated whole body dose = 1.0 + 0.2 mSv

*Source - ARSAC

In pregnancy, 50% of the normal adult dosage may be administered. In addition a perfusion study or limited ventilation study will generally be performed to further reduce radiation dose.

Mothers who are breast feeding should express milk before being injected with MAA and must then refrain from breast feeding for 12 hours.

RADIONUCLIDE BONE IMAGING

Examinations :

Bone scan, Whole body bone scan, 3 phase bone scan & bone SPECT
Valid reasons for performing the examination.

Suspected bone tumour (primary or secondary).

Malignancy.

Suspected bone infection.

Suspected loosening or infection or a joint replacement.

Suspected fracture with normal X-ray.

Bone/joint pain with normal X-ray.

Paget's disease.

Assessment of arthritis activity.

Standard Views.

Whole body bone scan.

A delayed 2 frame study giving anterior and posterior views of the entire skeleton.

Static Bone scan.

Delayed static anterior/posterior images of the axial skeleton and any painful area.

3 Phase Bone Scan.

Phase 1. 24x3 sec dynamic frames of the area of interest.

Phase 2. A static blood pool image of the area of interest.

Phase 3. Delayed static images of the area of interest, & of the surrounding area.

Bone SPECT.

360-degree rotational SPECT data is acquired to produce multislice images in 3 planes.

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

Radiation dose.

*Effective dose = 3.0 mSv using 550 MBq of 99mTc MDP/HDP.

*Effective dose = 5.0 mSv using 800 MBq of 99mTc MDP/HDP for SPECT.

*Source - ARSAC

Children's dosage calculated according to body weight.

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with MDP/HDP and must then refrain from breast feeding for 24 hours (48 hours if a SPECT dose of 800 MBq is used).

RADIONUCLIDE INFECTION IMAGING

Examinations :

Gallium Bone scan, Gallium scan (PUO), HMPAO Labelled white cell scan and Leukoscan.

Valid reasons for performing the examination.

Lymphoma activity

PUO ? cause

? Infection

Suspected bone infection

Suspected infection of a joint replacement

? Abscess

Standard Views

Gallium Bone scan

After a 24 hour delay, a 256 matrix image is acquired of the area of interest. Subsequent images are acquired using a 128 matrix and focus on the area immediately surrounding the first view.

Gallium scan (PUO)

After a 24 hour delay, the following views are taken:

Anterior Skull/shoulders

Anterior Thorax

Anterior Pelvis

Posterior Pelvis

Posterior Lumbar

Posterior Cervical/Thoracic

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

HMPAO LABELLED WHITE CELL SCAN

After a 1 hour delay, the following views are taken:

Anterior Skull/shoulders

Anterior Thorax

Anterior Pelvis

Posterior Pelvis

Posterior Lumbar

Posterior Cervical/Thoracic

The scan is repeated 4 hours post injection

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

Leukoscan

After a 1 hour delay, a 256 matrix image is acquired of the area of interest. Subsequent images are acquired using a 128 matrix and focus on the area immediately surrounding the first view.

The scan is repeated 4 hours post injection

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

Radiation dose.

Gallium Bone scan/Gallium PUO scan

*Effective Dose = 8.3 mSv using 74 MBq of 67Gallium1

*Source ARSAC

1Quoted ARSAC Reference = 17.0 mSv using 150 MBq of Gallium.

Please note this examination is contra-indicated in pregnant women and

Mothers who are breast feeding.

Leukoscan/Labelled white cells

*Effective Dose = 3.0 mSv using 200 MBq of 99mTc HMPAO white cells

*Effective Dose = 6.0 mSv using 750 MBq of 99mTc Leukoscan

*Source ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with HMPAO or Leukoscan and must then refrain from breast feeding for 24 hours.

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

RADIONUCLIDE THYROID IMAGING

Examinations :

Static Thyroid images with or without uptake measurement

Valid reasons for performing this examination:

Thyroid mass.

Hyperthyroidism.

Retrosternal goitre.

Anatomical abnormality.

? Thyroid metastases

Standard Views.

The following views are taken for a standard scan:

Anterior uptake image.

Anterior static image.

Anterior marker image

Radiation dose.

*Effective Dose = 0.5 mSv for 40 MBq 99mTc pertechnetate.

*Source - ARSAC

Children's dosage calculated according to body weight.

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with pertechnetate and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE PARATHYROID IMAGING

Examinations :

Parathyroid images with or without image subtraction
Valid reasons for performing this examination:

? Parathyroid adenoma.

Standard Views.

The following views are taken for a standard scan:

4 X Anterior 99mTc pertechnetate static image, (magnification X 2) of the neck.

4 X Anterior 99mTc MIBI static image, (magnification X 2) of the neck.

A single Anterior 99mTc MIBI static image of the upper thorax.

Radiation dose.

*Effective Dose = 0.5 mSv for 40 MBq 99mTc pertechnetate.

*Effective Dose = 5 mSv for 400 MBq 99mTc MIBI.

*Source - ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with pertechnetate and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE DACROSCINTIGRAM.

Examinations :

Dacroscintigram (Lacrimal scan)
Valid reasons for performing this examination:

? Obstructed lacrimal ducts.

epiphorah.

Standard Views.

The following views are taken for a standard scan:

30 X Dynamic anterior frames of the eyes, (magnification X 4).

Post 'sniff' image.

Radiation dose.

*Effective Dose = 0.04 mSv for 8 MBq 99mTc Sn Colloid.

*Source - ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being given 99mTc Sn Colloid and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE MECKELS STUDY.

Examinations :

Meckels Study
Valid reasons for performing this examination:

? Meckels diverticulum

Standard Views.

The following views are taken for a standard scan:

6 X Dynamic anterior Anterior abdominal views acquired for 30 minutes.

Optional right Right Lateral at 35 Mins

Radiation dose.

*Effective Dose = 2.5 mSv for 200 MBq 99mTc Pertechnetate.

*Source - ARSAC (Quoted reference level 5 mSv for 400 MBq 99mTc Pertechnetate).

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with pertechnetate and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE GI BLEEDING STUDY.

Examinations :

GI Bleeding Study
Valid reasons for performing this examination:

? GI bleeding

Standard Views.

The following views are taken for a standard scan:

6 X Dynamic anterior Anterior abdominal views acquired for 30 minutes.

Optional right Right Lateral at 35 Mins

Optional anterior delayed image at 4 hrs

Radiation dose.

*Effective Dose = 3.7 mSv for 370 MBq 99mTc Sn Colloid.

*Source - ARSAC (Quoted reference level 4 mSv for 400 MBq 99mTc Sn Colloid).

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with Sn Colloid and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE LYMPHOSCINTIGRAM.

Examinations :

Lymphoscintigram
Valid reasons for performing this examination:

Swollen leg(s) or arm.

Lymphatic obstruction or damage.

Standard Views.

The following views are taken for a standard scan:

Anterior

Ankles

Tibiae

Knees

Femora

Pelvis*

Abdomen

Or scan as in 'whole body' mode after 30 minutes.

*If the activity has not reached the pelvis by the time that image has been completed, the patient should be allowed to walk around for a while. The images should then be repeated starting from the Ankles.

Radiation dose.

*Effective Dose = 0.4 mSv for 40 MBq 99mTc nano colloid.

*Source - ARSAC (Quoted reference level 0.4 mSv for 40 MBq 99mTc nano colloid).

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with pertechnetate and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE SENTINEL LYMPH NODE BIOPSY

Examinations :

Sentinel lymph node biopsy
Valid reasons for performing this examination:

Breast cancer

Standard Views.

The following views are taken for a standard scan:

Anterior 30 degree oblique of affected side

Anterior 30 degree oblique transmission image

Lateral of affected side

Lateral transmission image

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

If the activity has not moved from the injection site when the first image is acquired, the scan should be stopped and repeated after a further hour.

Radiation dose.

*Effective Dose = 0.4 mSv for 40 MBq 99mTc nano colloid. (2 day protocol)

*Effective Dose = 0.2 mSv for 20 MBq 99mTc nano colloid. (Same day protocol)

*Source - ARSAC (Quoted reference level 0.4 mSv for 40 MBq 99mTc nano colloid).

Please note these examinations are contra-indicated in pregnant women.

RADIONUCLIDE TUMOUR IMAGING

Examinations :

Gallium SPECT scan, MIBG Adrenal Scan, Octreotide scan, DMSA V (thyroid tumour) scan and Sestamibi (thyroid/non specific tumour)scan.

Valid reasons for performing the examination.

Gallium SPECT scan

? Lymphoma

MIBG Adrenal Scan

? Phaeochromocytoma

Octreotide scan

? Carcinoid

DMSA V (thyroid tumour) scan

? Medullary carcinoma of thyroid

Sestamibi (thyroid/non specific tumour)scan.

? papillary carcinoma of thyroid

Standard Views.

Gallium SPECT scan

After a 24 hour delay, 360-degree rotational SPECT data is acquired to produce multislice images in 3 planes of the area of interest.

Static images are also acquired using a 256 matrix and focus on the area immediately surrounding the SPECT Scan.

MIBG Adrenal Scan

After a 4 hour delay, the following views are taken:

Anterior Skull/shoulders

Anterior Thorax

Anterior Pelvis

Posterior Pelvis

Posterior Lumbar

Posterior Cervical/Thoracic

The scan is repeated 24 hours post injection

Octreotide scan

After a 4 hour delay, the following views are taken:

Anterior Skull/shoulders

Anterior Thorax

Anterior Pelvis

Posterior Pelvis

Posterior Lumbar

Posterior Cervical/Thoracic

The scan is repeated 24 hours post injection

CT/SPECT

Optional localisation or attenuation correction CT scan may be performed, according to protocol, or at the request of the ARSAC licence holder.

DMSA V scan

After a 4 hour delay, the following views are taken:

Anterior Skull/shoulders

Anterior Thorax

Anterior Pelvis

Posterior Pelvis

Posterior Lumbar

Posterior Cervical/Thoracic

Right Lateral Neck

Sestamibi Scan

After a 1 hour delay, the following views are taken:

Anterior Skull/shoulders

Anterior Thorax

Anterior Pelvis

Posterior Pelvis

Posterior Lumbar

Posterior Cervical/Thoracic

Radiation dose.

Gallium SPECT scan

*Effective Dose = 13.6 mSv using 120 MBq of 67Gallium1

*Source ARSAC

Quoted ARSAC Reference = 17.0 mSv using 150 MBq of Gallium

Please note this examination is contra-indicated in pregnant women and Mothers who are breast feeding.

MIBG Adrenal Scan

*Effective Dose = 13.0 mSv using 200 MBq of 123Iodine MIBG2

*Source ARSAC

Quoted ARSAC Reference = 6.0 mSv using 400 MBq of MIBG

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with MIBG and must then refrain from breast feeding for 21 hours.

Octreotide scan

*Effective Dose = 15.5 mSv using 200 MBq of 111Indium Octreotide3

*Source ARSAC

Quoted ARSAC Reference = 17.0 mSv using 220 MBq of Octreotide

Please note this examination is contra-indicated in pregnant women and Mothers who are breast feeding.

DMSA V (thyroid tumour) scan

*Effective Dose = 3.0 mSv using 400 MBq of 99mTc DMSA V

*Source ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with DMSA V and must then refrain from breast feeding for 24 hours.

Sestamibi (thyroid/non specific tumour)scan.

*Effective Dose = 4.9 mSv using 400 MBq of 99mTc Sestamibi4

Quoted ARSAC Reference = 11.0 mSv using 900 MBq of Sestamibi

*Source ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with Sestamibi and must then refrain from breast feeding for 24 hours. (48 hours if 900 MBq of 99mTc Sestamibi is used).

RADIONUCLIDE CARDIAC IMAGING

Examinations :

Cardiac Stress/Rest Perfusion SPECT scan, Gated Heart imaging (MUGA).

Valid reasons for performing the examination.

Cardiac Stress/Rest Perfusion SPECT scan

Myocardial Perfusion

Myocardial Infarction

Ischaemia

Chest pain

Abnormal ECG

Gated Heart imaging (MUGA).

Ejection fraction

Standard Views.

Cardiac Stress/Rest Perfusion SPECT scan.

360-degree rotational SPECT data is acquired to produce multislice images in 3 planes.

Optional CT attenuation correction may be performed, according to protocol, or at the request of the ARSAC licence holder.

Gated Heart imaging (MUGA).

A gated study is performed over the left anterior oblique aspect of the chest.

Radiation dose.

Cardiac Stress/Rest Perfusion SPECT scan

*Effective dose = 8.0 4.0 mSv using 800 400 MBq of 99mTc Tetrofosmin.

*Source - ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with tetrofosmin and must then refrain from breast feeding for 24 hours.

Gated Heart imaging (MUGA).

*Effective dose = 10.0 mSv using 800 MBq of 99mTc Pertechnetate.

*Source - ARSAC

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with pertechnetate and must then refrain from breast feeding for 48 hours.

RADIONUCLIDE HEPATO-BILIARY IMAGING

Examinations :

Static HIDA Liver scan, Bile Reflux, Gall Bladder Ejection Fraction.
Valid reasons for performing the examination(s).

Biliary dysfunction.

Biliary atresia.

Biliary pain.

Biliary leak.

Bile reflux.

Gall bladder ejection fraction.

Standard Views.

Static HIDA Liver scan, Gall Bladder Ejection Fraction.

The following views are taken for a standard scan:

A 30 - 40 minute dynamic phase is collected together with eight static frames.

If an ejection fraction is required, the patient must drink 300ml Calshake.

Following the fatty drink, the scan is repeated as above.

Bile Reflux

The following views are taken for a static scan:

A single 1 minute anterior frame pre milk drink.

Followed by eleven further 1 minute anterior frames post milk, acquired at five minute intervals.

Radiation dose.

*Effective dose = 1.0 mSv using 75 MBq of 99mTc eHIDA1.

*Source - ARSAC

1Quoted ARSAC Reference = 2.0 mSv using 150 MBq of 99mTc eHIDA.

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before being injected with eHIDA and must then refrain from breast feeding for 24 hours.

RADIONUCLIDE GASTRIC EMPTYING

Examinations :

Solid Meal Gastric Emptying

Valid reasons for performing this examination:

? delay in gastric emptying

Standard Views.

The following views are taken for a standard scan:

A one hour dynamic study is acquired anteriorly with the patient seated in front of the gamma camera. Imaging begins after the first mouthful is swallowed.

Radiation dose.

*Effective Dose = 0.3 mSv for 12 MBq 99mTc DTPA1.

*Source - ARSAC

Quoted ARSAC Reference = 0.3 mSv using 12 MBq of non-absorbable compounds

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before ingesting DTPA and must then refrain from breast feeding for 12 hours.

RADIONUCLIDE DATSCAN (BRAIN)

Examinations :

123 Iodine Datscan
Valid reasons for performing this examination:

? Parkinsonism

Tremor

Dementia

Standard Views.

The following views are taken for a standard scan:

A 360 degree rotation SPECT scan is performed of the head

Radiation dose.

*Effective Dose = 4.4 mSv for 185 MBq 123Iodine Ioflupane (DatScan).

*Source - ARSAC

Contraindications

Please note these examinations are contra-indicated in pregnant women.

Mothers who are breast feeding should express milk before and must then refrain from breast feeding.

TREATMENT PROTOCOL NO 1

AREA :- MACULAR OF THE EYE

VALID REASONS FOR TREATMENT

FOR STEREOTATIC RADIOTHERAPY TREATMENT FOR ACTIVE WET AGE-RELATED MACULAR DEGENERATION (Wet AMD)

STANDARD PROJECTIONS

4MM TREATMENT ZONE OF THE CENTRAL MACULAR THROUGH 3 SEQUENTIAL TREATMENT BEAMS

ADDITIONAL PROJECTIONS

N/A

DOSE REFERENCE LEVELS

16 Gy

ADDITIONAL INFORMATION

Specialist ophthalmology referrals only through agreed referral criteria for patients with active Wet AMD