

CONTROLLED DOCUMENT

Departmental Protocols Including Referral Criteria for Paediatric Plain Image Radiography for Primary and Hospital Referrals.

CATEGORY:	Procedural document.
CLASSIFICATION:	Clinical.
PURPOSE	Referral criteria for plain x-ray imaging as required under IR(ME)R 2017 for paediatrics.
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<ul style="list-style-type: none"> • Essential Reading for: All Imaging staff. All Hospital referrers. GP Practices. • Information for: All Staff. 	

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Introduction.

The purpose of this document is to assist the IRMER qualified referrer in making a request for plain x-ray imaging and to give support regarding referral pathways. These referrers may be within the hospital or external to the hospital such as GP practices but not exclusive to these settings. The document also supports radiographers in the vetting of requests prior to imaging to ensure compliance with IRMER guidelines. Radiographers will also access this document to ensure the correct projections are being undertaken for each request.

The Ionising Radiation (Medical Exposure) Regulations 2017 have a significant impact on the requesting, reporting and management of referrals to Imaging. Under the 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 and operator to ensure that the patient receives an exposure to radiation only when the result will affect the management of that patient.

A. The referrer must:

- Ensure the patient they are referring is the correct patient.
This means double checking that the clinical details and examination required are correct for the name
- Provide sufficient information so that the patient can be uniquely identified i.e. name, date of birth, address and hospital number
- Supply sufficient medical data and a clear clinical question to enable an x-ray or scan to be justified
- Supply their own details, including a reliable contact number and a signature

GP referral requests via the practice nhs.net account must have the GP's physical signature.

If there is no physical signature the GP must clearly state their name on the request. This request must come from the GP's own nhs.net email address. The referrer name on the nhs.net email address must be the same as referrer on the request.

The requests will be scanned into CRIS with a note to confirm that the request has come from the referrers email address, the email address of the referrer will also be added at this point.

- B. Should a referral need to be cancelled, the department must be contacted directly and a member of staff spoken to immediately. Electronic requests cannot be cancelled using the electronic referral system.
- C. Referrers must ensure that duplicate requests are not entered into the system.
- D. Any urgent requests out of hours require the referrer to telephone to discuss with staff as well as providing the referral (paper or electronic).

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The sharing of Usernames/Passwords is not acceptable and will not be condoned by UHB NHS Trust or any of its employees. This includes logging in on behalf of another staff member. GPs/staff members who are found to fail to abide by this condition will have their access revoked and this will be raised as a formal breach.

A period of account inactivity of 3 months or more will result in access being revoked.

The Trust is authorised to undertake spot checks on the 3rd party at any time in order to check national compliance and/or completion of Local Confidentiality Agreement and/or IG training compliance.

All staff where access is being requested must sign a Local Confidentiality Agreement which must be held by the GP practice and available to view at any time.

IT IS THE RESPONSIBILITY OF THE GP PRACTICE TO ADVISE US WHEN STAFF LEAVE AS SOON AS POSSIBLE SO THAT WE CAN REMOVE THEIR ACCESS.

If the imaging request is incomplete or illegible, legally the examination cannot be performed.

For all x-ray examination the operator (radiographer) must ensure:

- An Imaging Department request form has been completed
- Correct identification of the patient (Procedures for Medical Imaging, procedure 2)
- LMP check where appropriate (Procedures for Medical Imaging, procedure 4)
- Where appropriate, the patient is changed into a radiolucent gown with all radiopaque objects removed from the area of interest
- A full explanation of the procedure is given to the patient
- Any previous radiographs are available prior to the examination
- The correct radiographic views are undertaken – refer to departmental protocols and referral criteria
- The appropriate exposure is selected – refer to exposure charts
- The radiation dose is as low as reasonably practicable
- Dose Area Product (DAP) or exposure details are recorded on the RIS
- The operator name and number of exposures are recorded on the RIS

If there are any concerns about a radiological request, please seek advice and guidance from a radiologist.

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Thorax (CXR).

Request	Referral Criteria	Projection	Comments
Chest Paediatric/ Neonatology.	See Appendix 1, (page 19).	Neonates – Supine. PA/AP/Supine*.	Depending on the age of the baby. Lead needs to be used as much as possible. Pre-processing markers. QE site- Other than trauma, most children will be referred to BCH. No NNU service at QE. If there is an abnormality on a frontal chest radiograph that needs to be clarified, the standard investigation for this is now CT scanning and not a lateral chest radiograph. Lateral radiographs can still be performed to evaluate cardiac pacemakers post-insertion and occasionally in specific cases to evaluate the position of a drain or other medical device. Lateral radiographs can be performed at the direction of a radiologist and in this case the radiologist concerned should report the examination.
Portable Chest.	See Appendix 1 (page 20) for clinical indications. Patient must be unable to attend department due to the severity of their condition.	AP erect/ Supine. To be determined by the patients age and compliance.	Portable films offer poor visualisation of mediastinal and vascular structures, magnification of the cardiac silhouette and compromise visualisation of lung bases.

NOTES

* AP/ supine chest only if PA chest is impossible.

Request	Referral Criteria	Projection	Comments
Ribs.	Trauma.	PA/AP (CXR).	In general CXR should not be requested to specifically look for rib fractures. CXR is useful to exclude pneumothorax if clinically suspected. However multiple rib fractures may indicate significant injury in the appropriate context. However most of these patients will usually require hospital referral.

Thoracic inlet.	Suspected cervical rib.	PA.	May be indicated in the older child. Please seek advice and guidance from a radiologist.
Sternum.	Trauma - including mechanism. Sternal swelling.	Lateral. PA/AP chest.	
Sterno-clavicular joints.	Trauma/sports injury or non-traumatic swelling of a medial clavicle.	AP view/cranial angulated view of both clavicles.	Please seek advice and guidance from a radiologist is additional imaging is required.

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Skull and Facial Bones.

Request	Referral Criteria	Projection	Comments
Skull.	<p>In a child, fall from > 60 cm onto a hard surface, tense fontanelle, SPA.</p> <p>Paediatric skull imaging is indicated in ?early sutural fusion.</p> <p>Lump/ foreign body.</p> <p>Hydrocephalus shunt dysfunction.</p>	<p>PA/AP(only if PA cannot be obtained) Townes.</p> <p>Tangential View.</p> <p>Lateral of skull and neck, AP/PA chest and AP & Lateral abdomen.</p>	<p>Follow Suspected Physical Abuse (SPA) protocol for imaging, page 14.</p> <p>Alteration in GCS- CT following discussion with a radiologist.</p> <p>Plain x-ray imaging is considered when there is suspicion of craniosynostosis however US and MRI can be used for this as well (iRefer P09 page 146).</p> <p>Collimate to include a bony landmark on the skull, to allow the referrer/reporter to orientate the position of the lump. External foreign body marker to be used as appropriate.</p> <p>These views to be taken in this order i.e. starting at the top to ensure overlap and shunt system integrity.</p>
Orbits.	See Foreign Body section (page16).		
Facial bones.	Orbital blunt trauma, mid facial trauma.	OM OM30°.	Facial bones are not recommended on very young children, especially under the age of 12. Please seek radiologist/ advanced practitioner/reporters advice if an opinion is required.
Nasal bones.	Not indicated.		
Sinuses.	Not indicated.	OM (open mouth) PA 15°.	Please seek advice and guidance from a radiologist.

Mandible.	Mandibular Trauma. Cyst/abscess, Suspected tumour.	PA Mandible and OPG. PA Mandible and OPG.	RT and LT Lateral oblique if OPG not possible.
TMJ.	TMJ Dysfunction/Dislocation.	OPG, TMJ's.	Please seek advice and guidance from a radiologist. iRefer E11 page 82 – MRI or CT indicated not plain film. Usually in older children.

Abdomen (AXR).

Request	Referral Criteria	Projection	Comments
Abdomen/ KUB.	See Appendix 2, page 20.	AP Supine to include diaphragms and symphysis pubis. Left Lateral decubitus to help exclude perforation. Supine.	AXR is not routinely indicated for suspected appendicitis or gastro- intestinal haemorrhage. Not indicated for persistent neonatal jaundice or non-bilious projectile vomiting (suspected pyloric stenosis).

Thoracic Spine.

Request	Referral Criteria	Projection	Comments
Thoracic Spine.	Trauma.	AP, Lateral.	<p>If thoracic pain with any focal neurology Please seek advice and guidance from a radiologist.</p> <p>If there is any predisposing cause suspected (cancer/inflammation/night pain/long term steroid use) – consider MRI after discussion with secondary care.</p> <p><i>refer to radiologist for all other clinical indicators.</i></p>
Thoracic Spine.	Suspected scoliosis.	AP, Lateral.	<p>Radiologist to confirm.</p> <p>Whole spine imaging available (Heartlands, Good Hope and Solihull sites only).</p>

Lumbar Spine.

Request	Referral Criteria	Projection	Comments
Lumbar Spine Trauma.	Trauma with lumbar area pain.	AP, Lateral.	
Lumbar Spine Non trauma.	Suspected scoliosis.		<p>Radiologist to confirm.</p> <p>Whole spine imaging available (Heartlands, Solihull and Good Hope sites only).</p>

Upper Extremity.

Request	Referral Criteria	Projection	Comments
Shoulder.	Trauma.	AP, Axial/Wallis view/Lateral Scapula.	2 nd View, following the AP projection should be site and patient dependant. Ultrasound is preferred for suspected rotator cuff tear.
	Recurrent dislocation.	AP, Axial.	
	Non traumatic pain, eg arthropathy, calcific tendonitis.		
Scapula.	Trauma.	AP, Lateral.	
	Congenital .		
	Infection .		
Clavicle.	Trauma. Infection.	AP.	If AP looks normal, a lordotic projection should be undertaken as an additional view.
	Acromio- clavicular joint.	Trauma. Suspected. Subluxation.	Coned AP. Comparison view of other ACJ may be required. Discuss with a radiologist or advanced practitioner. Weight bearing views are not routinely indicated.
Humerus.	Trauma.	AP, Lateral.	
	Infection. Unexplained pain or deformation.		

Upper Extremity.

Elbow.	Trauma. Suspected arthropathy Unexplained pain or deformity.	AP, Lateral.	Pulled elbow can be diagnosed clinically. Only indicated if suspicion of fracture.
Radius/ Ulna.	Trauma. Unexplained pain or deformity.	AP, Lateral.	
Wrist.	Trauma. Suspected arthropathy Unexplained pain or deformity.	PA, Lateral.	
Scaphoid.	Trauma.	PA (ulnar deviation), Lateral, AP and PA oblique, 30 degree angulation.	Scaphoid ossifies at 4-6 years. Discuss with a radiologist if child is younger than 4 years.
Hand.	Trauma. Unexplained pain or deformity.	DP, Oblique.	Lateral view for fractured/ displaced metacarpals. Soft tissue exposure for FB.
Hand and wrist for bone age.	Developmental delay.	PA hand and wrist NB- <u>The left or Non dominant hand must be imaged.</u>	The middle finger must be in alignment with the wrist, no deviation of the wrist. This should be performed on children one year and over.
Thumb.	Trauma. Unexplained pain or deformity.	AP, Lateral.	Include 1st carpometacarpal joint.
Fingers.	Trauma. Unexplained pain or deformity.	AP/PA, Lateral.	Oblique projection for fingers which are strapped.

Lower Extremity.

Request	Referral Criteria	View	Comments
Femur.	Trauma. Unexplained pain or deformity.	AP, Lateral.	
Knee.	Trauma with inability to weight bear or pronounced bony tenderness. Unexplained pain or deformity. Locking.	AP Horizontal beam lateral. AP and turned lateral.	Knee views should not be undertaken for Osgood Schlatter disease. Skyline and intercondylar views are specialist orthopaedic referral only.
Tibia and Fibula.	Trauma, with inability to weight bear or pronounced bony tenderness. Unexplained pain or deformity.	AP, Lateral.	
Ankle.	Trauma with inability to weight bear or pronounced bony tenderness. Unexplained pain or deformity.	AP, Lateral.	Include the base of the 5 th metatarsal on the lateral projection.

Lower Extremity.

Calcaneum.	Trauma with an inability to weight bear.	Lateral, Axial.	
Foot.	Trauma.	DP, Oblique.	Lateral view for dislocation or fracture of the tarsals or metatarsals.
Toes.	Trauma.	DP, Lateral.	Obliques may be necessary if a lateral is unachievable.
Hallux.	Trauma.	DP, Lateral.	

Paediatric Skeletal Surveys.

Skeletal Dysplasia.	<ul style="list-style-type: none"> • Chest • Pelvis • Skull • Left humerus • Left forearm • Left hand • Left femur • Left tibia/fibula • Thoraco-Lumbar Spine 	<ul style="list-style-type: none"> • PA/AP • AP • Lateral • AP • AP • DP • AP • AP • AP/Lateral 	Discuss with a radiologist.
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Suspected physical abuse (SPA) – Initial Presentation.
MUST DISCUSS WITH CONSULTANT RADIOLOGIST.

Skull.	Skull X-rays should be taken with the skeletal survey even if a CT scan has been or will be performed.	AP, Lateral and Townes.	
Chest.	Left and Right Oblique views of both sides of the chest and all 12 sets of ribs.	AP including the clavicles and all 12 sets of ribs.	
Abdomen.	AP of abdomen including the pelvis and both hips.	Supine.	
Spine.	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.	Right Lateral.	This may require separate exposures of the cervical, thoracic and thoraco-lumbar regions. AP views of the cervical spine are rarely diagnostic at this age and should only be performed at the discretion of the supervising practitioner.
Limbs.	<ul style="list-style-type: none"> • Both Humeri • Both Radiuses and Ulnae • Both Femora • Both Tibiae & Fibulae • Both ankles (Mortice) • Both Hands & Wrists • Both Feet • Both Elbows • Both Wrists • Both Knees • Both Ankles 	<ul style="list-style-type: none"> • AP • AP • AP • AP • AP • DP • DP • Laterals • Laterals • Laterals • Laterals 	

**Suspected physical abuse (SPA) – Follow up Projections.
MUST DISCUSS WITH CONSULTANT RADIOLOGIST.**

Chest.	AP including the shoulders and all 12 sets of ribs.	AP. Left and Right Oblique views of both sides of the chest and all 12 sets of ribs.	
Limb.	<ul style="list-style-type: none"> • Both Humeri • Both Radiuses and Ulnae • Both Femora • Both Tibiae & Fibulae 	<ul style="list-style-type: none"> • AP • AP • AP • AP 	
Additional.			Follow-up radiographs should be performed of any abnormal or suspicious areas on the initial skeletal survey as per radiologist.

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Foreign Body.

Request	Referral Criteria	Projection	Comments
Skull.	Foreign Body in scalp.	Tangential view.	To include skin marker. Collimate to include bony landmark.
Orbits.	FB – trauma only. Pre MRI screening.	OM - Eyes up and eyes down. PA 20 eyes up.	
Upper and Lower Extremities	Penetrating injury. (Type of FB must be specified).	e.g. AP/PA and Lat. A tangential view may be helpful to localize a foreign body.	Use a marker to localize the entry wound. Remove dressings where appropriate.
Throat.	Swallowed Foreign Body.	Lateral.	Soft tissue exposure, Valsalva manoeuvre.
Chest.	Inhaled Foreign Body- <ul style="list-style-type: none"> • Potential / suspected ingestion of button battery (child 6 years & under); may be un-witnessed ingestion Chest & Abdomen for known ingestion of button battery if: <ul style="list-style-type: none"> • symptoms develop • post 4 days ingestion if greater than 15mm cell by child less than 6years • post 10-14 days ingestion to confirm passage 	PA/AP	Ingested button battery requests must be dealt with urgently. Pathway for the ingestion or suspected ingestion of extra strong rare earth magnets –page 18.
Abdomen.	Swallowed Foreign Body (Only done for sharp objects or batteries).	Supine.	To include diaphragm to rectum.

	<ul style="list-style-type: none"> • Potential / suspected ingestion of button battery (child 6 years & under); may be un-witnessed ingestion <p>Chest & Abdomen for known ingestion of button battery if -</p> <ul style="list-style-type: none"> • symptoms develop • post 4 days ingestion if greater than 15mm cell by child less than 6years • post 10-14 days ingestion to confirm passage 		<p>Pathway for the ingestion or suspected ingestion of extra strong rare earth magnets –page 18.</p>
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NPSA Alert.

Ingestion or suspected ingestion of extra strong rare earth magnets.

Request	Referral Criteria	View	Comments
<p>Abdomen +/- Chest.</p>	<p>NPSA Alert:</p> <p>Ingestion or suspected ingestion of extra strong rare earth magnets.</p> <p>Neodymium magnets (also known as NdFeB, NIB, Neo magnet or Super Strong Rare-Earth Magnets.</p> <p>Rare earth magnets are between five and ten times stronger than ceramic magnets and are sometimes called 'super strong' or powerful magnets.</p>	<p>Erect Chest X-ray and abdominal X-ray (with the patient lying down prone if possible). Image clearly marked as prone or supine.</p> <p>In the case of a single magnet being identified on an abdominal X-ray, a HBL supine abdominal X-ray should also be performed to confirm that only one magnet has been ingested and to check for perforation.</p> <p>DO NOT PERFORM A LATERAL DECIBITUS.</p> <p>A lateral chest x-ray should be performed if a single magnet is seen in the chest.</p>	<p>Follow up abdominal X-ray should be performed at 6-12 hours in those patients who are asymptomatic (only repeat CXR if magnets are seen in the chest on the first image). It is essential that the abdominal radiographs are always performed in the same position (lying down, ideally prone).</p> <p>Repeat imaging may be requested every 6-12 hours until it can be demonstrated that the magnet has passed through the stomach and it is progressing through the small bowel or beyond.</p> <p>Continuation with imaging will usually be on confirmation of a single magnet being ingested.</p> <p>Urgent report is required. Notify referrer when the image had been reported.</p> <p>External magnetic objects nearby, clothes with metallic buttons or belts with buckle should be removed from the patient.</p>

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Appendix 1.

Referral Criteria for Chest Imaging.

Respiratory Distress Syndrome (RDS)

Broncho Pulmonary Dysplasia (BPD)

Pulmonary Interstitial Emphyema (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

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 greater than 15mm cell by child less than 6years
- post 10-14 days ingestion to confirm passage.

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Appendix 2.

Taken from the 'Referral Criteria for Abdomen'. (iRefer Guidance 2017. 8th Ed.)

Indicated:

- Intussusception in children.
- Ingested Foreign body – adhere to agreed imaging for this presentation.

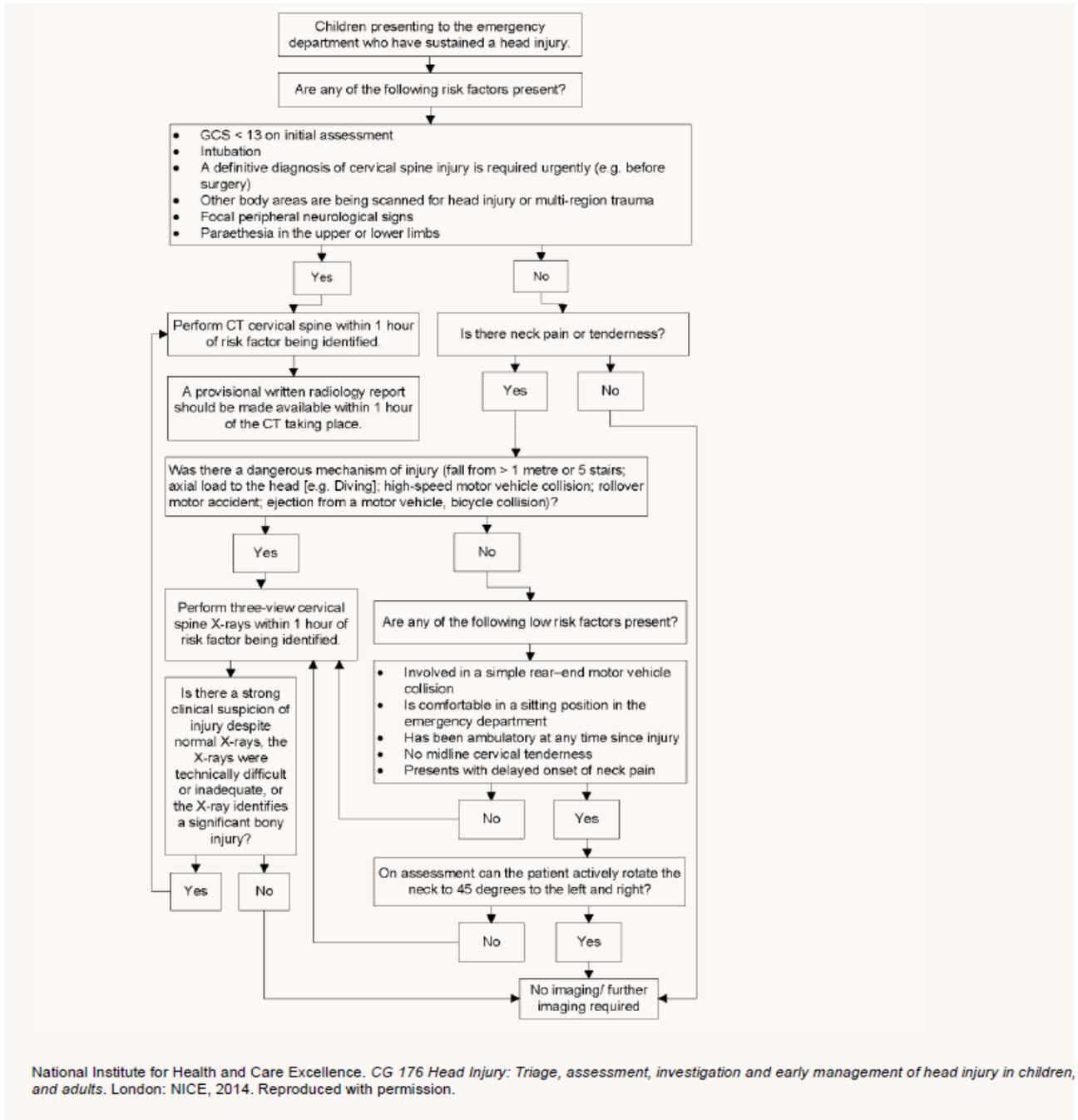
Indicated in specific circumstances:

- Blunt abdominal trauma.
- Recurrent vomiting in children. May identify the level of bowel obstruction.
- GI bleeding per rectum if necrotising enterocolitis is suspected.
- Acute abdominal pain. Generally not performed before Ultrasound (US).
- Constipation- only in specific circumstances, not indicated for diagnosis or monitoring response to treatment.

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Appendix 3

Selection of Children for Imaging of the Cervical Spine.



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