

## Standard Operating Procedure

### Polytrauma CT SOP

Refer also to following SOP(s) / Other Imaging Documents: 'CT Traumagram Protocol for Polytrauma' Issue date Feb 2016, Imaging Dept, BSUH.

Refer to Risk Assessment: N/A

Refer to COSHH Assessment: N/A

Location(s): Imaging Shared Drive, CT

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*Developed in conjunction with the MajorTrauma Centre Committee BSUH.*

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## 1. INTRODUCTION

This standard operating procedure covers adult patients undergoing polytrauma CT (defined below) at the Royal Sussex County Hospital, a major trauma centre.

To facilitate decision making and communication for CT imaging of potentially seriously injured patients from the emergency department.

A polytrauma CT is a CT scan carried out on a patient with suspected serious injuries which includes the chest, abdomen, pelvis and whole spine. A CT brain may also be included.

## 2. READERSHIP

This procedure is to provide guidance for all Imaging Department staff involved in trauma CT.

## 3. ROLES AND RESPONSIBILITIES

On-call radiologist: radiologist available at RSCH between 5pm – 9 am. Specialist registrar may be contacted through switchboard or use extension 4096 (Level 5 reporting room). Consultant radiologist also available via switchboard.

Trouble-shooting radiologist: SpR or consultant radiologist at RSCH available for queries between 9am – 5pm. Contact on extension 7690.

CT radiographer: Radiographer performing CT scans. Available on bleep 8800.

Trauma team: An eight-person team assembled to receive a patient and undertake assessment and resuscitation. The defined roles are: team leader, examining doctor, airway control, airway support, Nurse 2, CVS (doctor), scribe and Nurse 3.

## 4. EQUIPMENT

Equipment used in EDCT.

## 5. HAZARDS and SAFETY and RADIATION PROTECTION

Staff and Patients – Exposure to ionising radiation.

Patients – Transfer from bed to CT table.

## 6. PROCEDURE / SYSTEMS

### 6.1 Request for Polytrauma CT

6.1.1 Polytrauma CT is indicated in the context of significant blunt trauma if any of the following are present:

#### Vital signs

- respiratory rate  $\geq 30$  min of  $\leq 10$ /min
- pulse  $\geq 120$ /min
- systolic blood pressure  $\leq 100$  mmHg
- estimated exterior blood loss  $\geq 500$  ml
- Glasgow Coma Score  $\leq 13$

#### Clinical suspicion of

- flail chest, open chest, or multiple rib fractures
- severe abdominal injury
- pelvic fracture
- unstable vertebral fractures/spinal cord compression
- fractures of at least two long bones

#### Mechanism of injury

- fall from height ( $> 3\text{m}$  /  $> 10\text{ft}$ )
- high speed impact ( $\geq 50\text{km/h}$  combined velocity)
- ejection from the vehicle
- wedged or trapped chest/abdomen

6.1.2 Requests are made from an A&E consultant direct to a CT radiographer (verbally or by signing the request form).

6.1.3 All other indications must be discussed with a radiologist.

6.1.4 These referral criteria are to facilitate rapid imaging of seriously injured patients. There will be patients who meet the criteria but who do not need a polytrauma CT (e.g. lower limb fracture with tachycardia); in such cases targeted imaging will be more appropriate.

6.1.5 These guidelines relate only to blunt trauma. For penetrating trauma (e.g. stabbing) all requests should be discussed with a radiologist as targeted imaging and dual phase scans may be more appropriate.

6.1.6 The request form should include relevant clinical information to justify the scan (according to the referral criteria above) and also to assist in reporting of suspected injuries.

6.1.7 These referral criteria were introduced on 1<sup>st</sup> March 2013 on a trial basis and are subject to audit.

## 6.2 Role of the CT radiographer and scan protocol.

- 6.2.1** When the decision to perform Polytrauma CT has been made a request will be submitted to the CT Radiographer. Between the hours of 9-5 Monday – Friday this should be taken directly to the CT Radiographer in charge of EDCT. At all other times the CT Radiographer should be contacted via bleep 8800
- 6.2.2** The CT Radiographer will aim to prepare the scanner within 5 minutes of receipt of the request.
- 6.2.3** The clinical team will bring the patient to the CT scanner, fully prepared for the scan. The patient requires I.V. access and to have all jewellery and clothing removed prior entering the scanning room.
- 6.2.4** Scoops: In the case of the seriously ill Polytrauma patient they should be transferred on a plastic 'Ferno' scoop to facilitate smooth transfer of the patient. These should not be used in paediatric cases, and consideration should be made over young patients with a lower clinical suspicion, to prevent image artefact and increased Radiation Dose. Metal scoops or Vacmats should not be used for transferring Polytrauma patients. The purpose of keeping patients on a scoop is to limit movement of the patient thereby potentially reducing the risk of further haemorrhage or injury. If the scoop is removed then movement of the patient should be careful with the minimal logroll necessary to get the patient on and off the CT table using a patslide. Consideration should be given to minimizing spinal movement during all patient movements.  
Removing the scoop has the advantages of reducing artefact on the scan images and reducing radiation dose to the patient.  
The decision to remove/maintain the scoop is made by the ED consultant.
- 6.2.5** The Radiographer will scan the head first non-contrast. These images will be reconstructed and sent to PACS immediately after the scan. They will then scan the Cervical spine/Chest/Abdomen/Pelvis with contrast with the arms down. The axial slices for this scan will be reconstructed and sent to PACS while the Radiographer and anaesthetist/ED nurse prepares the patient for the post contrast dual-phase Chest/Abdo/Pelvis scan. For detailed scan protocol refer to 'CT Traumagram Protocol for Polytrauma' Issue date Feb 2016, Imaging Dept, BSUH.
- 6.2.6** To reduce image artefact monitoring wires should be removed whenever possible. In the case where they cannot be removed they should be positioned on top of a pillow over the patient's chest and abdomen. The arms should be raised above the patients head except in cases where this may cause further harm/injury. The patient will be connected to I.V. contrast (150mls Niopam 300) either by the CT Radiographer following the Trust PGD protocol, or in cases where the patient is 'off PGD' a member of the clinical team will prescribe this.
- 6.2.7** The patient will be scanned using the dual bolus Polytrauma Chest/Abdo/Pelvis protocol. Once the scan is complete the Radiographer will reconstruct the axial slices then assist the

clinical team in transferring the patient off of the CT scanner. When the patient is off the table the CT Radiographer will carry out multiplanar reformats of the C-spine T-spine L-spine and Pelvis. They will aim to complete this within 10 minutes of the patient leaving the scanning room.

In the situation where the patients head was positioned in a grossly undesirable position for the scan the CT Radiographer may carry out further multiplanar reformats of the head at the end.

- 6.2.8** Shoulder girdles: if there is suspected shoulder girdle injury (identified by the trauma team) the affected arm is not raised for the body scan. The whole shoulder girdle (including clavicle) should then be included in the scan of the thorax. Similarly, if the scanogram reveals a possible clavicle injury, the whole clavicle should then be included in the thorax scan.
- 6.2.9** Knees: if the scanogram reveals a comminuted knee injury, the CT pelvis may be extended to include the knees.

### **6.3 CT report from the radiologist**

**6.3.1** A member of the A&E team (the Team Leader) is to inform the radiologist that a polytrauma scan has been accepted by the CT radiographer at the same time as informing the CT radiographer.

During normal working hours the Team Leader can contact the Reporting Coordinator on extension Ex. 7723 / 7716 or Bleep: 8507 who will know which radiologist is available. Out-of-hours the on-call SpR should be informed. Contact via switchboard or use extension 4096 (Level 5 reporting room).

**6.3.1b** On some designated weekends between (Fri/Sat/Sun) 2100-0900 all requests for urgent CT imaging will go through Medica Nighthawk. The senior referring clinician should contact the Trust switchboard who will know whether to put through to the Medica Radiologist or the Radiology SpR on-call. This arrangement is expected to stay in place until August 2016.

**6.3.2** The radiologist will aim to provide a written report within 1 hour.

**6.3.3** When available, the radiologist may be asked by a member of the clinical team to provide a more urgent primary survey report (written or verbal) of life-threatening injuries.

**6.3.4** Reports provided out-of hours by radiology SpRs that state 'Provisional' will be checked by a consultant radiologist the following day. (Body CT scans will be checked by a general radiologist; head CT scans will be checked by a neuroradiologist.)

**6.3.5** Post-FRCR radiology SpRs may provide final reports for polytrauma CT cases if within their competence. In such cases the report will not state 'Provisional'.

**6.3.6** Polytrauma scans may rarely be performed at local hospitals other than RSCH. In such cases the on-call radiologist at RSCH will provide a second report on the original scan (unless performed at PRH). The emergency IEP procedure may be used to transfer CT

images to the BSUH PACS (until the network-wide PACS is available – anticipated in 2015). The Trauma team consultant is to request the second report. No second CT scan is required to be performed at RSCH unless there is a clinical deterioration or a delay in retrieving the external images that risks patient safety; in this case the second CT scan should be agreed with the on-call radiologist.

**6.3.7** Princess Royal Hospital: Polytrauma CT scans may rarely be requested for a patient at the PRH site (e.g. if clinical review of a trauma patient presenting to PRH indicates significant multiple injuries). In these cases all requests must be approved by the radiologist on-call.

**6.3.8** Penetrating trauma (e.g. stabbing) resulting in suspected severe injury should be imaged with contrast-enhanced CT. This should be a targeted CT of the relevant body part rather than a complete polytrauma CT. Requests for such CTs should all be agreed by a radiologist prior to scanning.

#### 6.4 Pregnant patients

All cases of known pregnancy should be discussed with the on-call radiologist prior to the scan for justification. The same scan protocol is used as for non-pregnant patients. IV iodinated contrast for CT is safe in pregnancy. In major trauma the risk of radiation to the foetus is small compared to the risk of missed/delayed diagnosis of maternal injury.<sup>2</sup>

#### 6.5 Paediatric patients

All paediatric patients should be discussed with the paediatric radiologist prior to a polytrauma CT scan.

#### 6.6 Training Implications

Training of CT radiographers was carried out on use of the referral criteria following their introduction.

Training of Radiology Specialist Registrars in reporting of polytrauma CT is ongoing.

### 7 MONITORING & QUALITY CONTROL

Developmental Outcome Measure	Monitoring Outcome Measure	Frequency	Responsibility for performing monitoring	Where is monitoring reported and who will be responsible for progressing and reviewing action
Imaging department audit of polytrauma CT	Justification; time to report; reporting discrepancies	Annual	Dr Ahmed Daghir	To imaging department at QSPE. To A&E consultants.

Trauma audit research network (TARN)	Time to CT	Monthly	Monitored by Trauma team	Reported nationally to TARN. Responsibility of trauma committee.
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### 7.1 Monitoring Arrangements

Audit of polytrauma CT practice is to be carried out annually to include the following

- a) Time from referral to time of scan.
- b) Radiologist's report available within a recommended target of 1 hour<sup>1</sup>

Audit of polytrauma CT may also include the following:

- c) Justification – based on whether patients met the referral criteria for polytrauma CT.
- d) Scan quality including the presence of artefact and radiation dosage.
- e) Accuracy of provisional reports by radiology Specialist Registrars by comparison with final consultant report.

The first of these is collected routinely for TARN (Trauma Audit Research Network). The other outcomes were audited in February 2013 and September 2014.

### 8. DISSEMINATION

Radiologists and radiographers involved in EDCT  
ED and Neurosurgery departments

### 9. REFERENCES

Standards of practice and guidance for trauma radiology in severely injured patients. Royal College of Radiologist 2011.

Imaging of Trauma: Part 2, Abdominal Trauma and Pregnancy—A Radiologist's Guide to Doing What Is Best for the Mother and Baby. Sadro et al. AJR (2012) 199: 1207-1219.



## 10. APPENDICES / RELATED DOCUMENTS

### 10.1 APPENDIX 1: Referral criteria for polytrauma CT

Polytrauma CT is indicated in the context of significant blunt trauma if any of the following are present:

#### Vital signs

- respiratory rate  $\geq 30$  min of  $\leq 10$ /min
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#### Clinical suspicion of

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#### Mechanism of injury

- fall from height ( $> 3m$  /  $> 10ft$ )
- high speed impact ( $\geq 50km/h$  combined velocity)
- ejection from the vehicle
- wedged or trapped chest/abdomen

#### Notes:

- Requests will continue to be made from an A&E consultant direct to a CT radiographer (verbally or by signing the request form).
- All other indications must be discussed with a radiologist.
- The A&E team must inform the radiologist that a scan has been arranged at the same time as informing the CT radiographer.
- These guidelines are to facilitate rapid imaging of seriously injured patients. There will be patients who meet the criteria but who do not need a polytrauma CT (e.g. lower limb fracture with tachycardia); in such cases targeted imaging will be more appropriate.
- These guidelines relate only to blunt trauma. For penetrating trauma (e.g. stabbing) all requests should be discussed with a radiologist as targeted imaging and dual phase scans may be more appropriate.

### 10.2 APPENDIX 2: Contact information

On call radiologist: available between 5pm – 9am. Contact via switchboard or use extension 4096 (Level 5 reporting room).

Trouble-shooting radiologist: available between 9am – 5 pm. Contact via extension 7690.

Reporting Coordinator on extension Ex. 7723 / 7716 or Bleep: 8507 who will know which radiologist is available.

CT radiographer: contact on bleep 8800.

On some designated weekend nights between 2100-0900 all requests for urgent CT imaging will go through Medica Nighthawk. The senior referring clinician should contact the Trust switchboard who will know whether to put through to the Medica Radiologist or the Radiology SpR on-call. This arrangement is expected to stay in place until August 2016..

## 11. DOCUMENT HISTORY/REVIEW

<b><u>Document Name</u></b>	Polytrauma CT SOP	<b><u>Current Filename</u></b>	sop-ct-001 polytrauma ct sop may 2016
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<b><u>Issue</u></b>	<b><u>Date</u></b>	<b><u>Review Details</u></b>
1	13/02/2014	Issued
2	Mar 2016	Reviewed, transferred to new template, agreed at MTC committee
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