

## Trauma CT Scanning Protocol

### Background

Whole body CT (WBCT) has assumed a pivotal position in trauma management. UK trauma is typically described as “blunt and blind” i.e. blunt trauma leading to injury patterns that are often occult and impossible to accurately characterise by clinical examination and plain radiographs. TARN data demonstrates that mean time to CT scan in the UK is 90 minutes – acknowledged as too slow and a major reason for delay to diagnosis and definitive treatment. WBCT is crucial to the diagnosis and management in particular of haemodynamically unstable patients without a clinically clear cut diagnosis – it is this challenging group that has the greatest potential to benefit from a system that delivers a quick and safe passage to the CT room, if necessary with resuscitation ongoing.

### Goals of this Protocol

The rapid and safe scanning of the selected patient group utilising a standardised CT protocol to allow diagnosis of life threatening and other significant injury. Specifically...

- To ensure an appropriate and timely alert system for CT radiographer and radiologist.
- To appropriately triage trauma call patients, rapidly identifying those patients fulfilling criteria for trauma WBCT.
- Having identified this group, **to effect CT scanning in 30 minutes or under** following arrival in resus.
- To determine a standardised manner of transfer from resus to CT room, for both intubated and non-intubated patients, to include who accompanies the patient.
- To standardise the set up of the trauma patient in CT, including positioning of the patient and equipment.
- To establish a standard scan protocol and reporting priorities.

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## Alerting the CT Radiographer and Subsequent Action

- The on call radiographer is on the 'Trauma Call' alert from switchboard.
- On receiving a trauma call, the ongoing and planned work in the Level 3 CT scan room should be assessed and a sensible decision made of the correct point to pause this work to ensure scan availability for the trauma case if necessary.
- On arrival of the trauma patient in resus, a very early decision regarding requirement for WBCT is made. It is the responsibility of the trauma team to ensure the immediate communication of this decision to the radiographer via the CT radiographer DECT – 23911.
- If a decision is made for WBCT, the radiographer should make immediate contact with the appropriate on-call radiologist to inform them.

## Indication for Immediate Whole Body CT Scan in Trauma

A single positive parameter from any of the three categories leads to the possibility of serious internal injury and WBCT should be initiated.

<b>Mechanism</b>	<b>Apparent Injury</b>	<b>Vital Signs</b>
Any high speed RTA, eg <ul style="list-style-type: none"> <li>• Combined speed &gt;30mph</li> <li>• Roll over</li> <li>• Ejection</li> <li>• Concurrent death</li> <li>• Trapped &gt; 30 min</li> </ul>	Evidence of blunt thoraco-abdominal trauma	GCS < 9
	Evidence of open thoraco-abdominal trauma	Sys BP < 90mmHg (guide)
	2 or more long bone #	Persistent tachycardia >100
	Significant CNS trauma suspected	Resp Rate <10 or > 29
Car v pedestrian/cyclist (high energy)		SaO2 < 93%
Fall > 3m (use judgement)	Intubated at scene	
Significant assault to trunk		
Blast or burn + trauma		
Other high energy mechanism		

Clinical judgement is still required in the sensible application of this triage scheme, e.g. targeted CT of head and neck will be more appropriate in certain low energy traumas (GCS<9 following single punch etc).

The trauma team leader may additionally request WBCT at his/her discretion for any reason falling outside the above.

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## Preparing for Transfer from Resus to CT room

- Priority tasks completed (as per Trauma Team guideline).
- Full O2 cylinder with dual Schraeder valve + tubing connector.
- Monitor on trolley foot shelf, X2 block from main bay monitor.
- Minimum monitoring is
  - SaO2
  - 5 lead ECG
  - Non invasive BP
  - Capnography if ventilated
- Arterial line and pressure transducer set at discretion of trauma team.
- If ventilated, the ventilator will hang on outside of trolley side rail.
- Chest drain bottles to hang from side rails below level of chest
- Single infusion pump for sedation of intubated patient (usually propofol 1%), sits between patient's legs.
- Drugs for transfer if intubated
  - Sufficient propofol
  - Rocuronium 50mg vial
  - Metaraminol 10mg in 20ml N. saline
  - Resuscitation drug box (in transfer bag)
- Resuscitation fluid if indicated to be hung from trolley drip stand. Disconnect Level 1 for transfer (may be re-connected in CT). Appropriate additional fluid to be brought. Blood products in appropriate grey insulated blood transfer bag.
- Spinal protection in place
  - Spinal board and scoop stretcher may be left in situ
  - Hard collar and foam blocks

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## Who accompanies patient?

- The default is for the entire trauma team to accompany the patient to scan to effect ongoing resuscitation. The CT will on many occasions be part of the assessment of 'C' and does not signal the end of the resus team efforts.
- It is at the discretion of the team leader to change this default if he so wishes e.g. with a stable patient, however a minimum of one doctor and one nurse from the trauma team must accompany any patient to scan.

## **Within the CT Room**

- Enter scan room with trolley to left of table head first. The patient will be positioned head first on scan table.
- Transfer from trolley to table should be via a log roll and patslide or on the spinal board or scoop stretcher which may remain in situ for scan.
- Patients should have their arms positioned by their side.
- Patients should be flat on the scan table, with no head rest but ongoing spinal protection in place.
- Monitoring, ventilator and infusions may be placed at the foot of the bed visible to the control room.
- The ventilator is connected to room O2 supply on the pendant which should be in position to prevent pulling on the ventilator by the O2 pipe at the extremes of scan table movement.
- Chest drains should remain unclamped with drainage bottles placed on the floor close to the scanning ring. There should be sufficient length on the tube to allow the full range of patient movement within the scan with the bottle in this position.
- Fluid resuscitation may be continued – drip stands ideally to the right of the scan table.
- Contrast infusor pump is connected to large bore access.
- The trauma team should not be in the scan room during actual scanning. Set up periods in between scan phases allow time for the team to re-enter if necessary. Be guided by the radiographer.
- Scan Phases
  - Initial scannogram – gross pathology may be seen – e.g. large pneumothorax or pelvic fracture.
  - Non contrast CT of head and c-spine.
  - Contrast is injected with a 60 second gap before chest, abdo, pelvis CT.
  - Total scan time including set-up estimated to be 10 minutes from time patient on table.

## **Reporting and Decision Making**

Immediately following the scan the radiologist should give a focussed verbal primary report to the team leader, aiming to include/exclude major life threatening injuries e.g.

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- Intracranial pathology
- Thoracic pathology
  - Pleural collections of air or blood
  - Pulmonary contusion
  - Great vessels
- Abdominal/ Retroperitoneal
  - Bleeding
  - Injured viscera
  - Vessel injury
- Pelvis and proximal femora

The results of the scan and the patient's clinical condition guide subsequent action. Decision making should be by the team leader and appropriate specialty doctors and will essentially be dichotomous

1. Transfer to theatre or other place of definitive treatment (e.g. angio suite).
2. Return to resus for ongoing management, secondary survey and treatment planning and placement.

The formal CT report should be completed and communicated within 1 hour of the CT scan being completed.

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