

## Whole Body CT Imaging Guidelines for North Bristol Trust

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<b>Distribution:</b>	Severn Major Trauma Network, Trauma Team Leaders, Trauma Team
<b>Related guidelines:</b>	
<b>Further information:</b>	
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### **Aims:**

Describe the default image acquisition technique for Whole body CT in the context of major adult trauma at NBT.

Describe additional image acquisitions at the time that may be of benefit in particular clinical scenarios.

Give an example of an alternative single phase injection, multiphase acquisition technique for trusts not familiar or comfortable with biphasic injection, single acquisition imaging techniques in trauma.

# Whole body CT Imaging in Adult Trauma

## Background:

Whole body multidetector CT (MDCT) is the imaging modality of choice and gold standard for radiological assessment of the severely injured patient (SIP).

Integration of MDCT in early trauma care significantly increases the probability of survival in multi-trauma patients <sup>[1]</sup>. When a decision to proceed with MDCT has been made by the trauma team, transfer to the CT suite must not be delayed by inferior imaging modalities such as digital radiography or ultrasound.

MDCT protocols in trauma imaging have moved away from segmental body component imaging towards single pass and multiphase contrast injection scanning to shorten examination time and improve vascular and parenchymal enhancement and imaging <sup>[2][3]</sup>.

## CT Protocols:

The default MDCT whole body protocol in adult trauma at North Bristol NHS trust is a modified version of the camp Bastion 'military' protocol.

- Head and Neck – Ideally imaged with arms down
  - Brain - Unenhanced acquisition (0.625/1.25mm) with bony and soft tissue recons with the 3mm soft tissue recons made immediately available for review.
  - C-Spine - Unenhanced spiral acquisition (0.625/1.25mm) from base of skull to T4 with 2mm axial, coronal and sagittal bony recons.
- Thorax, abdomen and pelvis – Ideally imaged with arms up
  - Lung apices to symphysis pubis (bone and soft tissue algorithms)
  - 150mls iodinated contrast biphasic contrast injection – Initially 85mls @ 2mls/sec followed by 65mls @ 4mls/sec.
  - Image acquisition at 60 secs post initiation of contrast injection.
    - If there is high clinical suspicion of significant intracerebral or cervical vascular injury in the SIP then the post-contrast scan volume should start at the level of the circle of Willis. This should be agreed at the time of the scan by the supervising radiologist and TTL.
    - Additional delayed phase imaging in the presence of suspected high grade renal, collecting system or bladder imaging should be discussed by the supervising radiologist and trauma team leader (TTL) at the time of scan.
    - High clinical suspicion of a significant lower limb arterial injury merits extending the scan volume to cover the area of concern.

Alternative MDCT whole body protocols for trauma units not familiar with multiphasic whole body trauma imaging should include as a minimum non-contrast imaging of the head and neck supplemented by arterial phase imaging of the chest, abdomen and pelvis and portal venous phase imaging of the abdomen and pelvis.

An example protocol is given below:

- Head and Neck
  - Unenhanced acquisition (0.625/1.25mm) brain (bony and soft tissue recons) with 3mm soft tissue recons immediately available for review
  - Unenhanced spiral acquisition (0.625/1.25mm) from base of skull to T4 with 2mm axial, coronal and sagittal bony recons
- Lung apices to symphysis pubis (bone and soft tissue algorithms)
  - 100mls iodinated contrast @ 3.5mls/sec.
  - Arterial phase: Commence scan @ 25 seconds post injection – Lung apices to symphysis pubis.
  - Portal venous phase: Commence scan at 65 seconds post injection from dome of liver to symphysis pubis.
  - Consider delayed scan if suspicion of significant renal collecting system or bladder injury.

An immediate (within 5 minutes) primary radiological survey should be given to the trauma team leader following image review on PACS.

An example proforma for communicating significant life threatening injuries is given below.

A detailed secondary radiological survey report should be available within 1 hour.

A consultant-verified report should be made available at the earliest opportunity, definitely within 24 hours and ideally within 1 hour of image acquisition.



## RADIOLOGICAL PRIMARY SURVEY CHECKLIST

PATIENT NAME:

MRN:

DATE:

TIME ON SCANNER:

RADIOLOGIST:

SPR 1 2 3 4 5 6 CONSULTANT

AIRWAY				BREATHING			
ET TUBE PLACEMENT	N/A	INCORRECT	CORRECT	DRAIN PLACEMENT	N/A	INCORRECT	CORRECT
FOREIGN BODY		YES	NO	PNEUMOTHORAX		YES	NO
AIRWAY OBSTRUCTION		YES	NO	HAEMOTHORAX		YES	NO
MAJOR AIR LEAK		YES	NO	COMMENTS:			
COMMENTS:							

CIRCULATION								
CHEST			ABDOMEN			PELVIS		
CONTRAST EXTRAVASTATION	YES	NO	CONTRAST EXTRAVASTATION	YES	NO	CONTRAST EXTRAVASTATION	YES	NO
GREAT VESSEL INJURY	YES	NO	FREE FLUID	YES	NO	FREE FLUID	YES	NO
MEDIASTINAL HAEMATOMA	YES	NO	LIVER INJURY	YES	NO	PELVIC FRACTURE	YES	NO
MEDIASTINAL GAS	YES	NO	SPLenic INJURY	YES	NO	IF RENAL INJURY, CONSIDER ADDITIONAL DELAYED PHASE STUDY		
PERICARDIAL FLUID	YES	NO	RENAL INJURY	YES	NO			
COMMENTS:								

DISABILITY		
INTRA CRANIAL BLEED	YES	NO
MASS EFFECT	YES	NO
C SPINE #	YES	NO
T – L SPINE #	YES	NO
COMMENTS		

This is an early (15 min) provisional report and is purely to help facilitate the immediate management of the patient. Only gross and life threatening injuries are commented on in this report - please ensure the full report is checked when available.

Clinicians Contacted  
 Name/Speciality/Grade .....

Time completed: ~~~

X- Rays			
CXR		Pelvis	
Others			

## References

- [1] Huber-Wagner S, Lefering R, Qvick LM, et al. Effect of whole-body CT during trauma resuscitation on survival: a retrospective, multicentre study. *Lancet* 2009;373:1455e61.
- [2] Nguyen D, Platon A, Shanmuganathan K, et al. Evaluation of a singlepass continuous whole-body 16-MDCT protocol for patients with polytrauma. *AJR Am J Roentgenol* 2009;192:3e10.
- [3] Loupatatzis C, Schindera S, Gralla J, et al. Whole-body computed tomography for multiple traumas using a triphasic injection protocol. *Eur Radiol* 2008;18:1206e14.