

Modality Selection

i. Radiographic Imaging

In principle, some radiographic imaging can occur after initial clinical assessment but prior to any CT imaging required. Radiographic imaging is primarily performed to ensure the patient is safe to proceed to CT medical imaging. It should be performed portably. However, radiographic imaging should not unduly delay more definitive imaging.

ii. Ultrasound

Extended Focused Assessment with Sonography in Trauma (E-FAST) scans on stable patients is not recommended if it will delay transfer to CT.

E-FAST has many valuable roles in severely injured patients including:

- Triage of multiple severely injured patients simultaneously, and
- Assessment of the hemodynamically unstable patient

Imaging using E-FAST, as with other forms of ultrasound, is operator dependent and local quality guidelines should be used to determine who is capable of performing these examinations.

iii. Multi-detector Computed Tomography (MDCT)

Multi-detector Computed Tomography (MDCT) is the imaging technique of choice for the definitive assessment in the trauma setting. CT scanning has markedly improved the clinician's ability to diagnose and define the extent of injury in patients with trauma.

However, the indiscriminate use of multiple CT scans for all trauma patients not only adds cost to the health care system but may also increase cancer risks for the patient later on in life. To reduce unnecessary or insufficient CT examinations, criteria-driven imaging requests can be used to determine the trauma patients' imaging needs. In the future, electronic decision support could be used to support the clinical decision process.

a) Standard Trauma Imaging CT Protocol

The basic set of CT imaging that will most often be used and should be considered the starting point for CT imaging of the severely injured patient. It consists of:

- Head (non-contrast)
- Cervical spine (non-contrast)
- Chest: CT angiogram (CTA) of thoracic aorta (with IV contrast)
- Abdomen and Pelvis (with IV contrast)

Criteria for the ordering of this Standard CT Protocol can be found in **Appendix C**.

Clinicians will help facilitate contrast-enhanced examinations if imagers are reading CT examinations remotely. Parts of the basic set of CT imaging can be removed if clinically indicated. For example, if GCS=15 in a patient with stabbing to the abdomen, then the necessity of the CT head could be questioned. This is outlined in **Appendix H**.

b) Additional CT Protocols

In addition to the Standard Trauma CT Protocol additional selective CT examinations or procedures could be added based on clinical indications or imaging findings. This can be ordered by the clinician or initiated by the imager. See **Appendix C** for indications and technical recommendations for Optional CT Protocols.

iv. Magnetic Resonance Imaging (MRI)

The need for magnetic resonance imaging (MRI) of non-pregnant adult trauma patients is usually limited to the cervical spine. Limited sagittal imaging through the thoracic and lumbar spine may also be performed if clinically indicated. A very small percentage of unconscious patients with normal CT scans of the cervical spine will have ligamentous injury (see **Appendix A** for discussion of evidence on *Occult Spinal Injuries*).

A reasonable approach to the clearance of the cervical spine in unconscious and likely intubated patients:

- A normal CT is adequate to clear the cervical spine of injury if:
 - CT of the cervical spine is normal and
 - patient is assessable neurologically (i.e. moves all 4 limbs) and
 - there is no clinical suspicion of spinal cord injury
- If one of these conditions is not met a neurosurgical consult for possible MRI of the cervical spine should be considered. An abnormal CT of the cervical spine can include significant degenerative changes, fracture or suspected ligamentous injury.