General Guidelines for CT Image Transmission

With newer scanners offering faster acquisition of thinner slices and an array of easily created reformatted images, we have seen the number of CT images transmitted per case increase dramatically from many sites. With the increasing number of images we have also seen increased transmission times per case. The additional information in a larger data set (thinner slices, exotic reformats) often does not offset the increased time required to transmit these larger studies, particularly for patients in the emergency department. At the request of numerous hospitals, we have developed the following general protocol guidelines for transmission of studies to be read by The Radiology Group to maximize the amount of diagnostic information while trying to keep in mind the urgent and sometimes emergent nature of the cases we receive. This document is intended only as a general guide and the parameters contained within are only suggestions. We recognize that each facility must design its own set of equipment specific protocols with local standards and radiologists’ preferences in mind. Suggestions are offered with adult patients in mind. Each institution will doubtless have its own set of pediatric protocols to follow.

Hopefully, these limited recommendations will prove helpful in tailoring your image transmission protocols to allow you to maximize the effectiveness of TRG’s service while minimizing turn around times.

If more specific protocol advice is desired, the ACR website (http://www.acr.org) or http://www.ctisus.com will likely have suggestions.

General:

In general, TRG workstations are able to window transmitted DICOM data sets with the caveat that imaging reconstructed with an edge enhancement algorithm provides greater detail for interpretation of lungs and bone. Edge enhancement, lung, or bone algorithms must be applied at the site.

Although we can create multiplanar reformatted images at TRG workstations, quality is limited by the resolution of the transmitted axial data. In general, thinner slice thickness means better reformatted image quality. Multiplanar reformatted imaging created at the site is generally superior. Preferred reconstructions and multiplanar reformating preferences will be further addressed specifically by exam type.

“Frame capture” (non-DICOM) images cannot be independently windowed by TRG workstations. For these exams we recommend at a minimum that data sets be transmitted with the following windowing provided:
**Brain**: Brain and Subdural windows with the addition of Bone windows for trauma cases.

**Abdomen and Pelvis**: Soft Tissue and lung windows for all studies with the addition of bone windows for trauma cases. Liver windows are preferred.

**DICOM Image Transmission**:

**CT Brain**: Skull base to vertex. Slice thickness should not exceed 8mm supratentorial and 5mm infratentorial. Standard soft tissue algorithm with the addition of bone algorithm reconstructions preferred, especially in cases of trauma or suspected bone pathology.

**CT Facial Bones/Orbits/Sinuses/Mandible**: Direct axial and coronal acquisition with slice thickness not to exceed 3mm, although thinner is better. In some cases direct coronal imaging may not be possible in which case reformatted coronal images should be transmitted. Standard/Soft tissue as well as Bone algorithm reconstructions preferred.

**CT Temporal Bones**: Slice thickness should not exceed 2mm. An edge enhanced reconstruction algorithm should be used. Soft tissue or Standard reconstruction algorithm is supplemental. Axial imaging should extend from the mastoid tip through the petrous bone. Coronal scans should extend from the mandibular condyles through the mastoid bone. Displayed field of view of approximately 9.6 cm or of sufficient magnification to allow clear visualization of the ossicular chain and inner ear structures.

**CT Cervical spine**: Craniocervical junction to T1. Slice thickness should not exceed 3mm. Images should be reconstructed using a bone algorithm. Sagittal and coronal reformatted images should also be transmitted. Axial Standard/Soft tissue algorithm reconstructions are additionally preferred.

**Chest General**: Slice thickness should not exceed 8mm. Standard/Soft tissue algorithm +/- lung (edge enhanced) algorithm reconstructions.

**Aortic Dissection**: Arch to bifurcation. Slice thickness should not exceed 5mm. Contrast should be administered. Standard/Soft tissue algorithm reconstructions.

**Pulmonary Embolism Protocol**: Slice thickness should not exceed 3mm. Standard or Soft tissue algorithm reconstruction. Lung/Bone algorithm is supplementary and NOT appropriate for interpretation for PE. The pulmonary arteriogram series should cover at least from the aortic arch through the top of the right diaphragm. Axial data is primarily utilized for interpretation. Reconstructions are considered supplemental. Additional standard chest imaging from apices to lung bases is often transmitted as per local

http://www.theradiologygroup.org
protocol. The addition of such a series allows for discovery of alternative lung pathology when PE is not present.

**Abdomen and Pelvis:** In general, slice thickness should not exceed 8mm, although 5mm is preferred. For suspected appendicitis or renal stone protocol slice thickness should not exceed 5mm. Standard/soft tissue algorithm reconstruction.

**Thoracic/Lumbar spine:** Continuous axial imaging with magnified field of view preferred. Acquisition of multiple angled smaller data sets through sequential levels is discouraged as it prevents creation and manipulation of reformatted imaging at the workstation. Sagittal and coronal reformatted images created on site are preferred.

**A special note on TRAUMA cases:**

When one patient is imaged for multiple exams as often happens with trauma cases, the number of images for the case can be quite large. If there is particular urgency with respect to anatomic location, it is recommended that multiple studies be broken up and send in smaller groups in order of priority to ensure timely evaluation of the site of primary injury without adding the delay of transmitting additional studies through regions where the index of suspicion for injury is low.

*Example: if a patient arrives with an obvious head injury, consider sending the CT BRAIN, CT CSPINE, CT FACIALS ahead of the CT ABDOMEN, CT PELVIS, CT CHEST and vice versa.*

Also, some sites routinely send reformatted sagittal and coronal reformatted imaging through the thoracolumbar spine for trauma patients. We have found this helpful for identifying vertebral compression fractures and prefer that such reformats be sent if possible, particularly if the site has a multi-detector array scanner.