

AbstractID: 8643 Title: Dose and image quality evaluation of a mobile CT scanner for head and neck imaging

Purpose:

To evaluate the radiation dose delivered to patients and personnel by a mobile x-ray CT scanner designed for bedside imaging of the head and neck, and to examine image quality under clinical conditions.

Method and Materials:

Computed Tomography Dose Index (CTDI) was measured using a 100 mm pencil ionization chamber and 16 cm diameter acrylic phantom over a range of acquisition parameters on a mobile CT scanner (Neurologica Ceretom, Danvers, MA). Scatter radiation was measured using the same phantom. Image quality was evaluated using the manufacturer's QA phantom and the common CATPHAN phantom.

Results:

At 120 kVp, CTDI-100 measured 44.8, 83.5, and 122 mGy at 7 mA and 2, 4, and 6 seconds per rotation, respectively. At 140 kVp, commonly used for head scanning, the CTDI-100 measured 65.3, 126.8, and 176.3 mGy at 7 mA and 2, 4, and 6 seconds per rotation, respectively. All measured doses were within 10% of the CTDI values indicated to the operator on the scanner's console. Using protective lead curtains provided with the scanner, scatter radiation was well within ALARA standards. CATPHAN images demonstrated acceptable alignment, slice width and incrementation accuracy, geometric accuracy, low contrast resolution, high contrast spatial resolution, image uniformity and CT number linearity at clinical techniques.

Conclusion:

When operated in "low dose" (2 seconds/rotation) mode, the radiation dose delivered by the mobile CT scanner is below or comparable to the ACR's diagnostic Reference Value (RV) for head CT dose. The "standard" (4 seconds/rotation) and "high-quality" (6 seconds/rotation) modes deliver more radiation, with a corresponding increase in image quality. Assessment using an industry-standard phantom produced acceptable image quality performance under clinical conditions. With proper precautions, the scanner can be safely used in most intensive care environments without additional shielding, with minimal occupational exposure.

Conflict of Interest (only if applicable):