

Joint Commission's OPPE program. The data represents an objective measure of quality that is readily captured and linked to individual attending IRs. Comparison with published reference levels from the RAD-IR study while favorable, suggests either that IRs or that imaging equipment, tools, patient selection or other factors have improved over the last decade. This highlights the need to develop institution specific reference levels and continually track results.

9:00 AM

Abstract No. 136

### A survey of radiation doses from CT-guided procedures at three teaching hospitals

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**Purpose:** To evaluate the variability of radiation doses associated with CT-guided interventional procedures using data from three teaching hospitals.

**Materials and Methods:** Radiation dose information from nine types of CT-guided procedures including biopsies, drain insertions, and ablations in the chest, abdomen and pelvis were contributed from three teaching hospitals. Participating institutions retrospectively identified up to 20 consecutive instances of each procedure type between 10/15/2009 and 4/15/2010. Aggregate data included 370 CT-guided procedures performed on 168 females and 202 males, including 50 chest biopsies, 22 thoracic drain insertions, 45 lung ablations, 50 abdominal biopsies, 50 abdominal drain insertions, 42 abdominal ablations, 50 pelvic biopsies, 41 pelvic drain insertions and 20 pelvic ablations. Effective Dose/Dose Length Product (E/DLP) values taken from the literature were used to convert the dose-length product to effective dose. Descriptive statistics were used to characterize the dataset.

**Results:** Lowest doses occurred for CT-guided biopsy, where median DLP was 268, 302 and 296 mGy-cm in thoracic, abdominal and pelvic biopsies, respectively. Highest median DLPs occurred in abdominal and pelvic ablations, where median doses of 1223 mGy-cm (range 229–8472) and 3302 mGy-cm (range 282–8427) were observed, respectively. For biopsies and drainages, more dose was accumulated from pre- and post-procedure scanning than from scanning during the procedure. For ablations, more dose was accumulated from scans obtained for procedural guidance. The mean effective dose for all cases was 8 mSv with a range of 1 to 160 mSv. Across institutions, the least variable doses were observed for thoracic drainage (11-fold variability) while the most variable doses were for abdominal drainage (74-fold variability).

**Conclusion:** Huge variability in radiation dose is seen in CT-guided procedures, with an average 38-fold difference between minimum and maximum DLPs for the 9 different procedure types. More study is required to identify the modifiable sources of such variability.

9:12 AM

Abstract No. 137

### The effect of needle guidance devices on operator hand dose during needle puncture procedures with combined cone-beam CT and real-time fluoroscopy guidance

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**Purpose:** Real-time fluoroscopy guidance using cone-beam CT overlay with dedicated needle path planning software (Philips Allura Xper FD20) is a promising new interventional technique. Disadvantage of real-time fluoroscopy is the radiation dose the operator receives per procedure. The purpose of this phantom study was to assess the effects on radiation hand dose and puncture accuracy using different needle guidance devices in combination with this new interventional technique.

**Materials and Methods:** Fluoroscopy time (FT), hand dose (using active personal dosimeter [Unfors EDD-30]) and accuracy were measured for each needle guidance device by four interventional radiologists (IR) on a phantom (CIRS) with internal targets (size 2.3mm). The use of no devices was compared to needle holders (Seestar [AprioMed] and Simplify [NeoRad]) and laser guidance by SimpliCT (NeoRad) ceiling-mounted (Portegra2 arm [Mavig]). The laser was used either alone or in combination with the needle holders. Each device and combination of devices was used at least three times by each IR, using needle trajectories with the same degree of difficulty.

**Results:** The lowest FT to reach the target was for SimpliCT and the combination SimpliCT-needle holders (mean of 24s [range 14–35]). Without devices and needle holders alone this was a mean of 51s (range 31–93). Using SimpliCT and the combination SimpliCT-needle holders also resulted in the lowest operators' hand dose: mean of 27 $\mu$ Sv per procedure (range 6–68). This compared to means of 293 $\mu$ Sv (range 67–468) and 324 $\mu$ Sv (range 96–732) for no devices and both needle holders, respectively. For both FT and dose, laser guided procedures are significantly lower than non-laser guided procedures ( $p < 0.001$ ). The accuracy for all needle guidance devices was the same, mean of 1.2mm off-target.

**Conclusion:** Laser guidance, alone or in combination with needle holders, achieves the best results of both reduced FT and operator radiation dose while affording good accuracy. Based on these findings, the laser is used as guidance tool in our clinical practice for difficult puncture procedures with small targets, like RF ablation of osteoid osteomas.

9:24 AM

Abstract No. 138

### Radiation dose during tunneled central venous catheter placement: Effect of trainee participation and flat panel detector use

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**Purpose:** Radiation caused by medical imaging and its potential effects on patients has caused considerable interest in the health care community as well as in the popular media. While most of the attention has focused on CT, fluoroscopy-guided procedures can deliver a significant dose to patients. The purpose of this retrospective review is to investigate factors that influence fluoroscopy time and thus patient radiation during fluoroscopy-guided procedures.

**Materials and Methods:** After IRB approval, the HI-IQ database was queried for tunneled central venous catheter placement (tCVC) returning 1,743 complete cases from January 2007 to June 2010. The data in the report included fluoroscopy time (f), dose