Integration of Automated CT Dose Tracking Software with Clinical Practice: Our experiences so far

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Introduction

Radiation dose monitoring is not only imperative for compliance with ALARA principle but also required for regulatory compliance in many jurisdictions (e.g. SB 1237 in California) or for meeting the accreditation requirements like U.S. JCAHO. However, maintaining and monitoring patient's radiation exposure is challenging in a busy academic practice and diverse CT technology. A commercial software (eXposure™) that estimates CT dose based on scan parameters on DICOM images was recently introduced in our practice. We investigated the feasibility and accuracy of software based automated CT dose tracking using abdominal CT exams as a model.

Materials and methods

A commercial software (eXposure™; v2, Radimetrics/Bayer, Canada) that estimates CT dose based on CT parameters on DICOM images was introduced in our practice after initial evaluation phase. All CT exams performed between Dec 12 and Jun13 on 17 scanners (GE=12, Siemens=3, Philips=2) were retrieved using the software. Out of 57,280 CT exams performed during this period, we retrieved all GI exams (n=16,820) performed (>50 protocols). Using the software we further tracked the dose profiles of routine abdominal exams (6680) along various scanners and reconstruction algorithms and compared data using t-test and ANOVA. We correlated the software based dose estimates with scanner generated dose reports for a phantom. We also tracked any outliers by plotting box plot for SSDE.

Results

It was feasible to automate dose reports of 6680 patients scanned using the above mentioned protocols on all 17 scanners. The average SSDE dose and variability within various scanner type were; GE (n=4342), 10.1±1.8, Philips (n=1470), 8.8±2.1 and Siemens (n=868), SSDE:9.6±2.9 (p value>0.05). Average dose and variability along various reconstruction algorithms; FBP (n=3126) SSDE=12.2±1.8, IRT (n= 3554), SSDE=9.3±2.1 (p<.0001). No significant differences were found between software and scanner generated dose estimates (p>0.05).

Conclusion

Despite the differences in the CT vendors and algorithms, we were able to implement department wide CT dose tracking software. This software enabled us to reliably estimate and monitor radiation exposure to patients. It also provides an opportunity to track dose outliers.