Purpose:To develop an automated patient-specific radiation dose monitoring system for CT capable of assessing variability in CT dose delivered to individual patients.

Methods:CT image data were sent from PACS to a secure dosimetry server. The dose reports were isolated by DICOM routing software and processed by an optical character recognition algorithm to extract the dose length product (DLP). The DICOM headers provided additional study information, including the study description, protocol, patient age, and patient gender. The effective dose was calculated from the DLP using age- and protocol-specific conversion coefficients.

We collected data from Duke University Medical Center (DUMC) and Duke Raleigh Hospital (DRH) over a 5 week period, during which we received over 6,500 CT studies. To assist in data analysis, a graphical user interface was developed capable of generating custom filters to isolate specific CT studies. The filters were used to assess variability in three typical protocols (standard chest, abdomen pelvis, and routine head) across both institutions.

Results:Our automated CT dose monitoring program permitted quality assurance on a scale that was previously impractical. We were able to identify individual studies that significantly deviated from the median and flagged them for further review to assess the cause of the elevated dose. Additionally, we employed the custom filters to directly compare dose across three CT scanner models at both DUMC and DRH. We found notable variability between scanners and institutions, indicating the potential for dose reduction and standardization without compromising image quality.

Conclusions:We developed an automated patient-specific CT dose monitoring system to assess variability in CT dose to individual patients. This tool facilitates quality assurance and standardization of CT protocols.