Purpose: To explore the application of cloud computing for quantifying and documenting patient radiation dose in interventional fluoroscopy.

Methods: In this study, a framework has been developed for providing personalized Monte Carlo based dose reports for patients undergoing interventional fluoroscopic procedures. The framework is built around the DICOM Radiation Dose Structured Report (RDSR) and the ability to automatically translate the imbedded information into an input file for the MCNPX radiation transport code. A three-step program was written to perform this task. The first step imports the RDSR and fills each row of a 2D array with the geometric and dose parameters connected to each irradiation event. The second step culls the array and summarizes the information into a limited number of irradiation events where geometric parameters for similar events are averaged and dose information summed. In the final step, each row of the summarized array is translated into an MCNPX input file by completing sections of a template file. An anthropometrically-matched hybrid phantom selected from the UF patient-dependent series is used to represent each patient. Initial testing was performed using twenty RDSRs received from Shands Jacksonville Medical Center. Monte Carlo simulation was executed on the ALRADS dosimetry cluster at the University of Florida, Gainesville.

Results: The program successfully received twenty RDSRs via the internet and processed over 50 MCNPX input files. Detailed patient dose reports were returned on demand within 24 hours.

Conclusions: While individual radiation transport is impractical within the clinic, a major technological shift has been towards internet-based “cloud computing” where programs are run on off-site servers accessed via the internet. In this environment and with the tools developed in this research, RDSRs can be uploaded from the clinic to the web and returned within a matter of hours as detailed radiation dose reports.