Purpose: Good performance in diagnostic radiology is not only defined by image quality but also by patient exposure. However, there is no established method for the automatic calculation of the effective dose received by patients, during diagnostic radiological examinations. Our objective is to develop a method for the automated evaluation of radiation exposure to patients, and to examine the plausibility of its implementation for dose-management.

Methods: Patient data including exposure information collected over three month, were extracted from a radiological information system, anonymized and saved in a database. A program was written to automatically calculate the effective dose, received by each patient from examinations with radiography systems. The parameters exam type, voltage (kVp), tube current-time product (mAs) and dose-area-product (Gy*cm²), if available, were used for effective dose calculation for a standard patient. The calculated values were saved in a database. A comparison was done between the calculated effective dose of the patients, and the diagnostic reference levels for diagnostic X-ray examinations dependent on age, period of time, and examination type. The examination type with the relative highest dose was optimized for patient exposure.

Results: On average, the dose applied to patients during diagnostic X-ray and computed tomography examinations significantly lower than the diagnostic reference level values. In the CT of the lumbar spine the exposure was only 20 % lower than the diagnostic reference level and therefore selected for further optimization. Change of FoV, kVp, pitch and mAs was performed to further reduce patient exposure without significantly reducing the image quality.

Conclusions: A method was developed, for the automatic calculation of the individual effective dose received by patients. This process can be implemented for dose management including optimization of patient exposure.