Purpose: The CTDIvol displayed on CT scanners is not patient specific. A practical method to estimate CT dose corrected for patient size, tissue composition, and anatomical location is presented.

Methods: The measured CTDIvol of acrylic cylindrical phantoms of diameters from 6-32 cm on a CT scanner revealed a logarithmic relationship with the phantom mass. The relationship has been used in 25 cases of each category of adult head, chest, abdomen and pelvic CT exams. Actual patient CT images have been used to measure the average CT numbers within image slices which are subsequently related to the total tissue mass. By applying the relationship between the actual CTDIvol and the total mass, the CT radiation dose has been adjusted for patient size and tissue composition.

Results: Overall, dose underestimation by the scanner dose report is well demonstrated in all 25 cases of adult chest exams (ranging from 9% to 80% under-estimation) because the lung tissue density is significantly lower. Even in the abdomen, which has a more consistent soft tissue density, there are adipose tissues and voids that complicate the dosimetry. The pelvis contains considerable amounts of bone, which has a much higher attenuation coefficient than soft tissues, complicating the estimation of radiation doses. Also, there is a significant variation in actual patient sizes even among adult patients; thus leads to a spread in actual CTDIvol delivered to these patients.

Conclusions: There is a nationwide effort to monitor patient CT dose. Because the current scanner-reported dose may underestimate the patient dose when the patient size is smaller than the assumed standard or the tissue density is lower, excessive dose outliers may be undetected. This is more likely to happen to pediatric patients. We present a practical method to provide a more accurate estimate of patient CT radiation dose.

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None.