

Efficacy of raw implementation and reduction dose protocols in CT colonoscopy: a single centre 4 years retrospective review

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Aims and objectives

CT Colonoscopy, or Virtual Colonoscopy, is well known as an effective alternative in patients that cannot sustain classic colonoscopy [1] (Fig. 1-2). Otherwise as all radiological procedure concerns arise for radiation exposure related to the examination [2]. If CT colonoscopy is considered necessary the radiation dose, according to ALARA principle should be the lowest [3]. For this reason we examined retrospectively our dose performance in CT colonoscopy in terms of CTDIvol and DLP considering the efficacy of different dose reduction factors.

Images for this section:

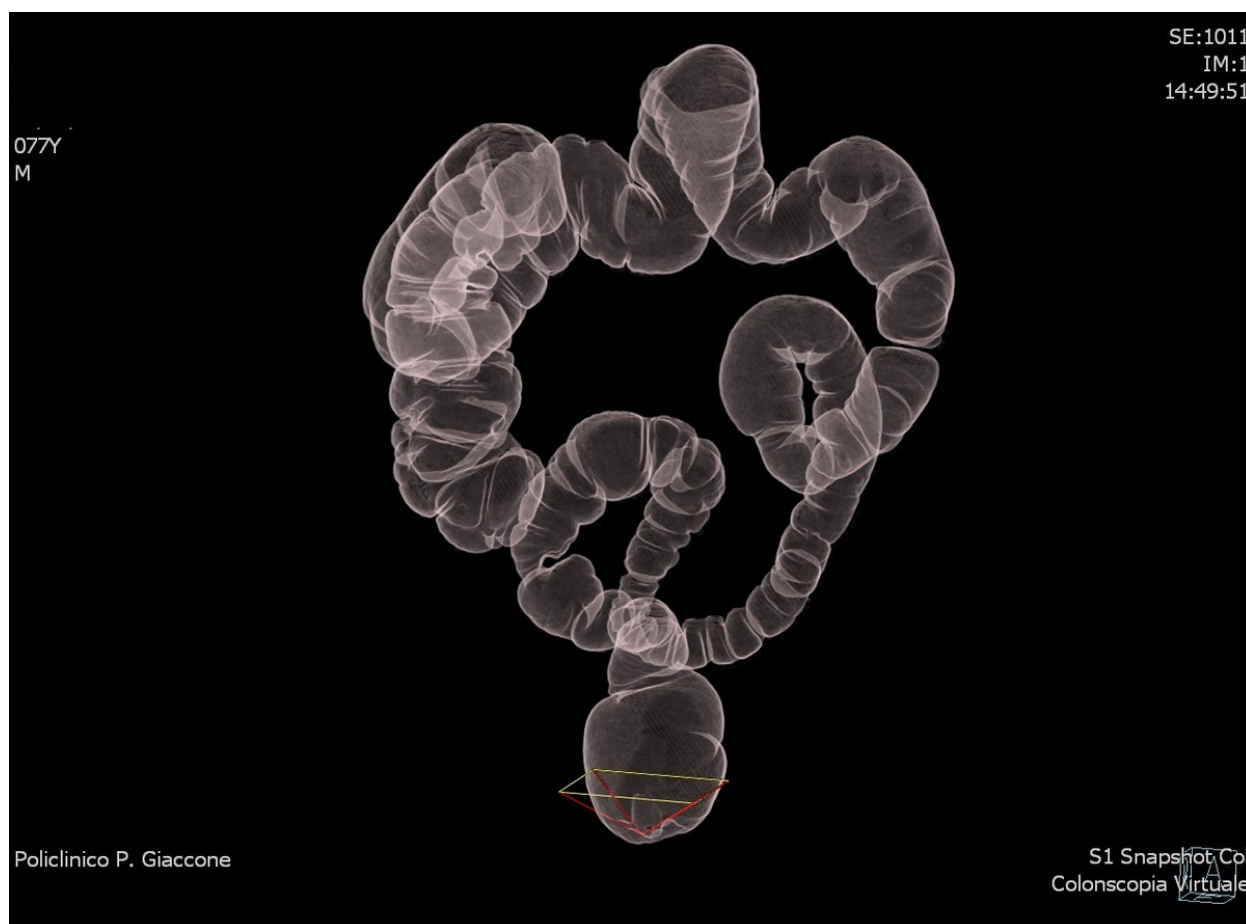


Fig. 1: Patient with incomplete colonoscopy due to unsurmountable angulation - 3D reconstruction

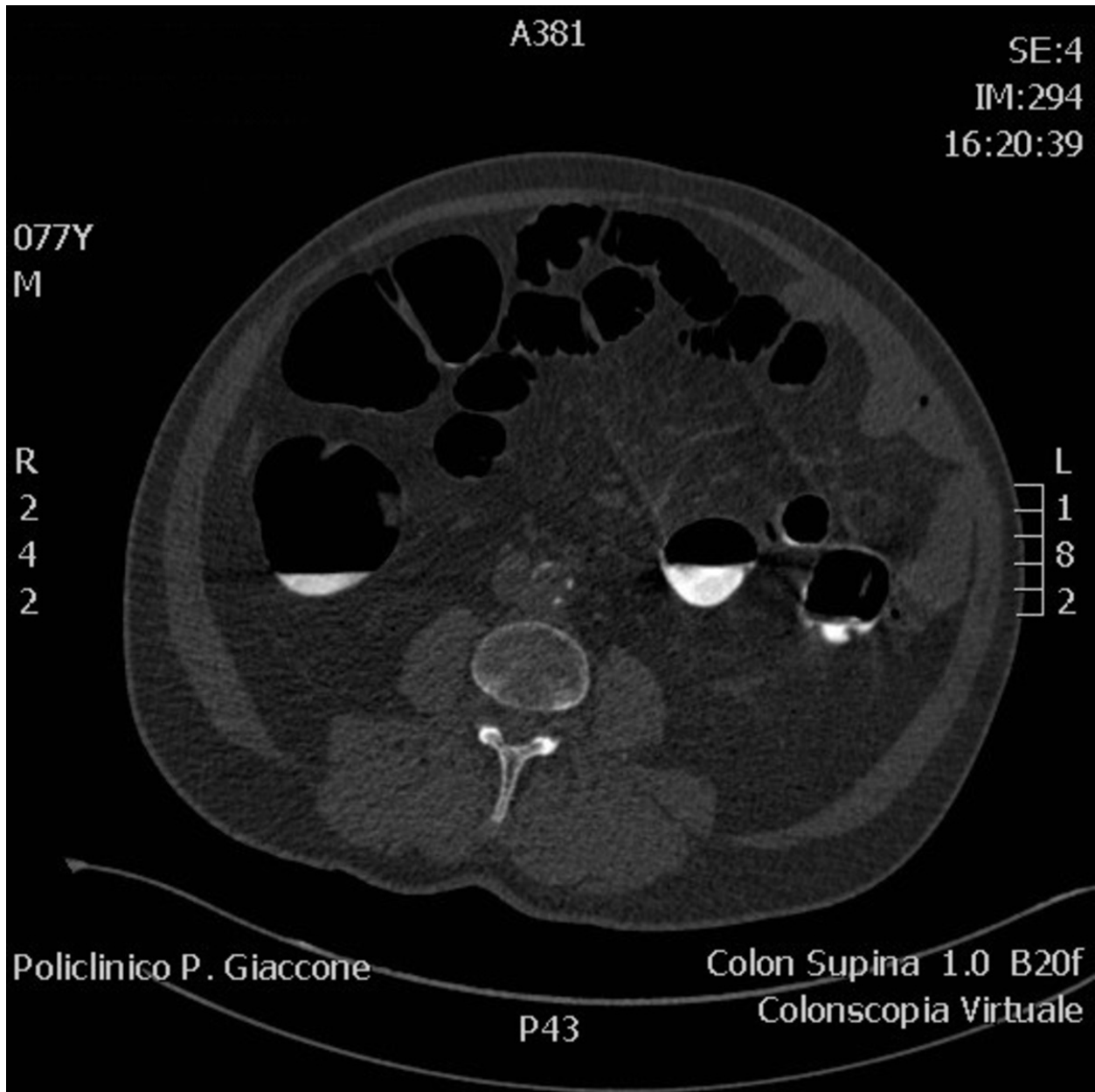


Fig. 2: Same patient as in Fig.1 - axial plane

Methods and materials

In our Department between 2011 and 2014, 136 patients, identified through our Radiology Information System (RIS), underwent to CT Colonoscopy. All exams were performed with two different MDCT apparatus: a 16-slice CT (GE Bright Speed Elite®) and a 128-slice CT (SOMATON Siemens Definition AS®). All the dosimetric data obtained were analysed using the CT Expo® software version 2.2, through which estimated effective doses were calculated according to the average cumulative value of tissue weighting. Our exam protocol consists of 2 scout scans and other 2 abdomen scans, respectively in prone and supine position (Fig.3-4).

Images for this section:

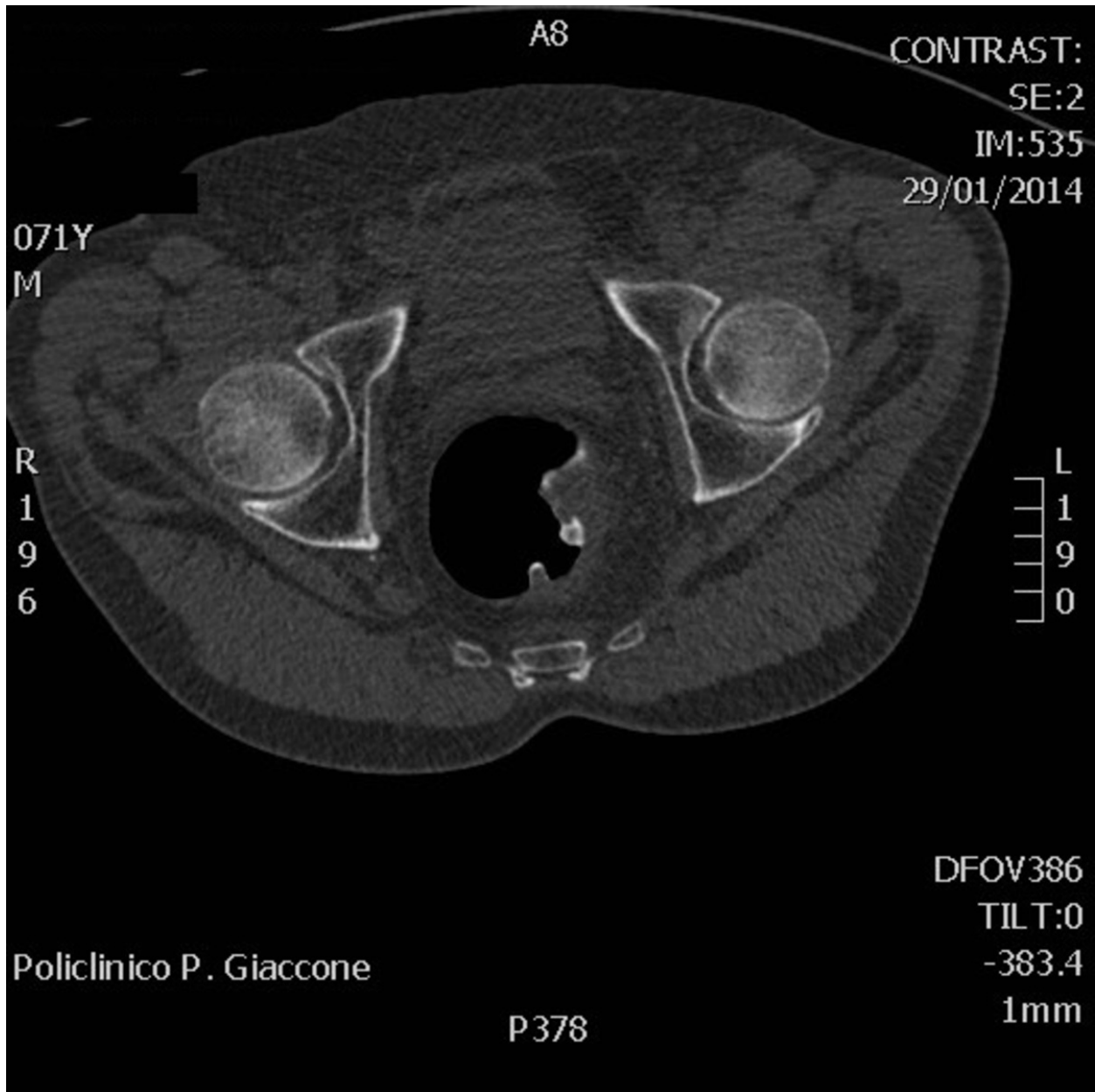


Fig. 3: Patient with incomplete colonoscopy due to poor compliance during the exam - prone position

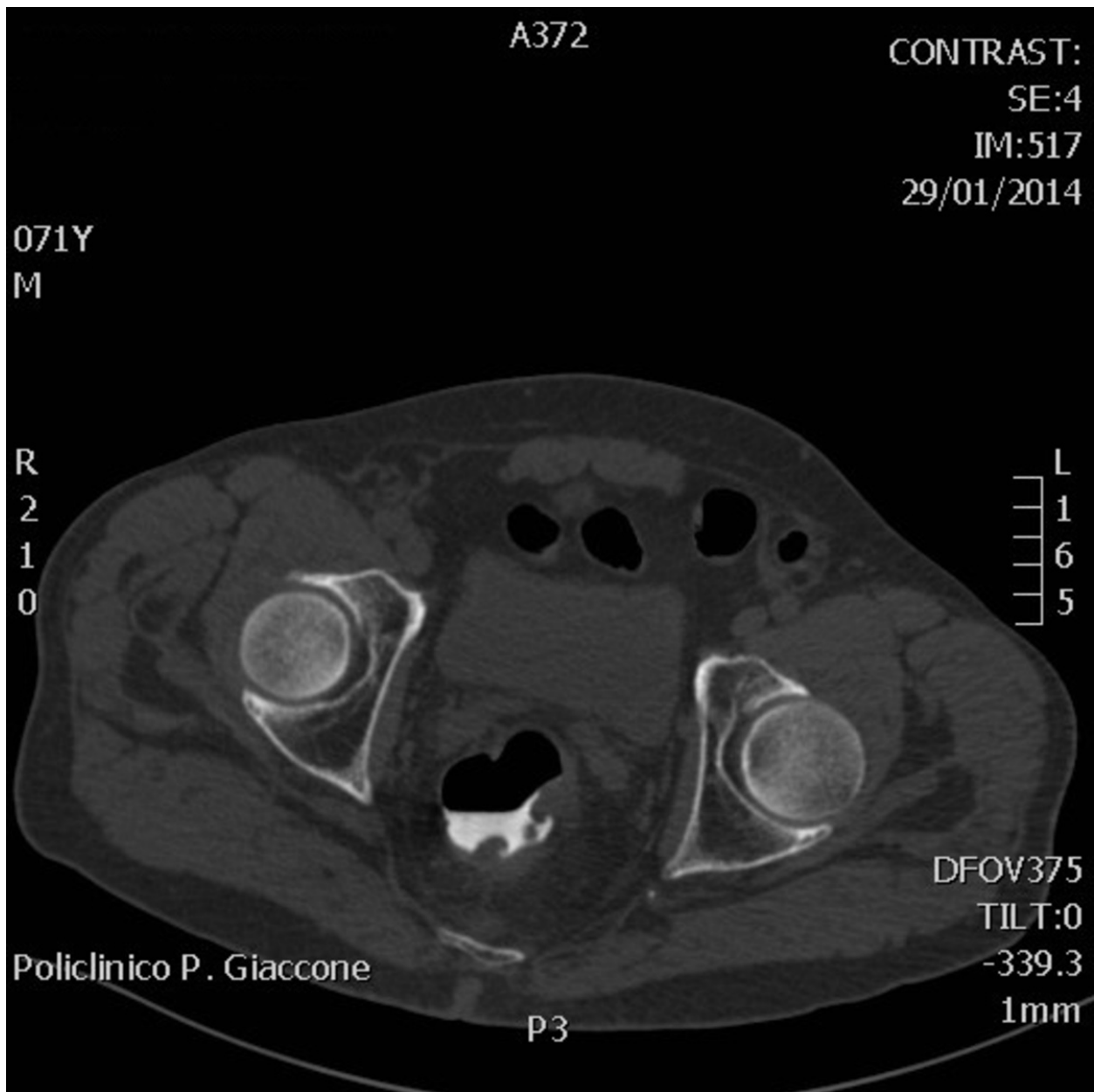


Fig. 4: Patient with incomplete colonoscopy due to poor compliance during the exam - supine position

Results

Patient's mean age was 62,49. We found significant differences in the two CT apparatus used (mean CTDIvol for the 16-slice was 12,36 mGy, while for 128-slice CT was 7,09 mGy; mean DLP for 16-slice CT was 563,78 mGy*cm, while for 128-slice was 309,68 mGy*cm). Mean effective dose for the 16-slice CT was about 9 mSv (range from 3 to 14 mSv, as showed in Fig.5), while for the 128-slice CT was about 5 mSv (range from 2 to 17 mSv, as showed in Fig.6).

Images for this section:

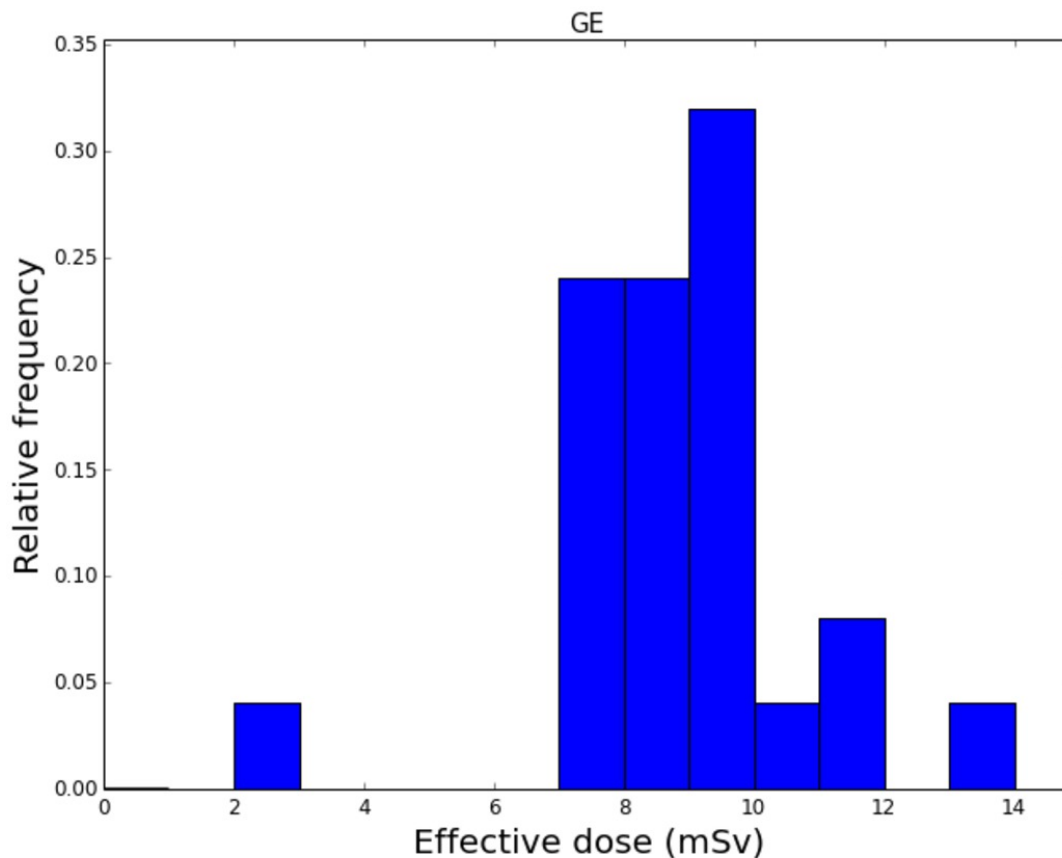


Fig. 5: Effective dose in 16-slice CT apparatus calculated via CT Expo® software version 2.2

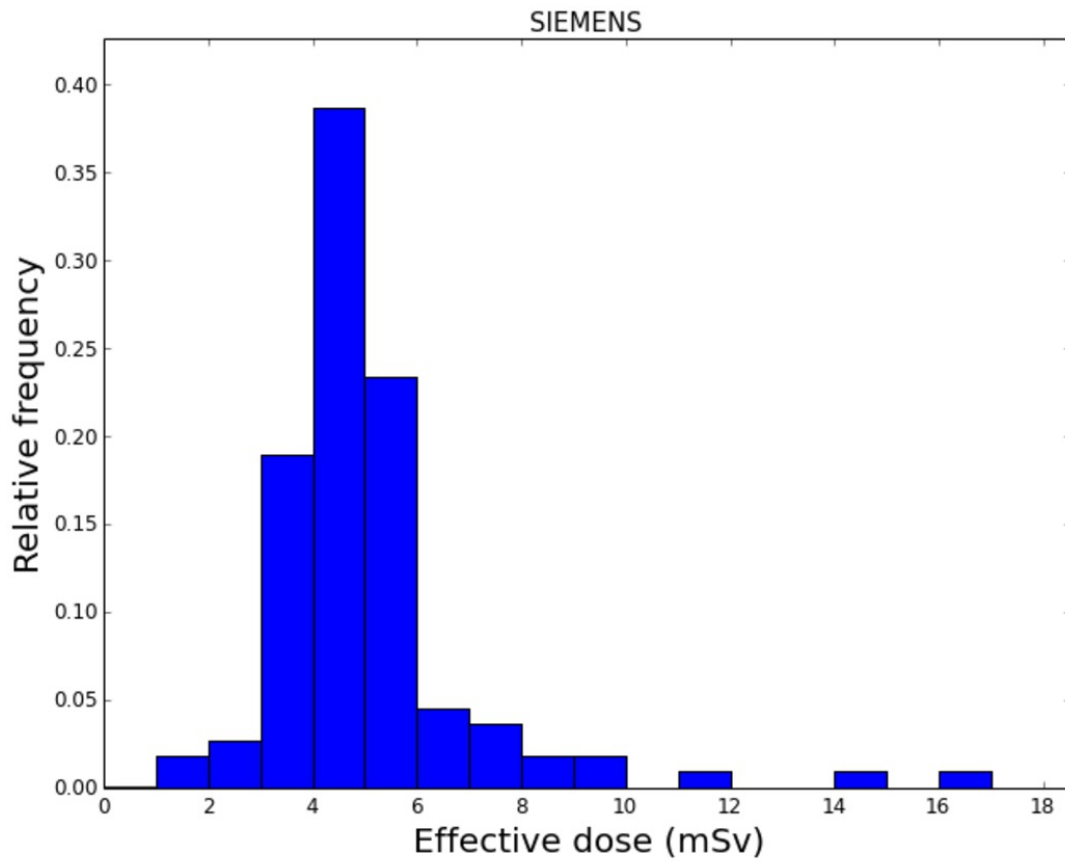


Fig. 6: Effective dose in 128-slice CT apparatus calculated via CT Expo® software version 2.2

Conclusion

We found that low dose protocols and up to date CT apparatus are essential for dose reduction. As expected, there's a significant difference between 16-slice CT apparatus and 128-slice. We compared our data to the latest Public Health England review (Doses from Computed Tomography Examinations in the UK - 2011 Review) [4], that is the largest and more extensive study on radiation dose in Europe, noticing a reduction on radiation dose exposure. Our best results, obtained with 128-slice CT apparatus (mean CTDIvol 7,09 mGy; mean DLP 309,68 mGy*cm), are significantly lower than ones obtained in the Public Health England review (mean CTDIvol 8,5 mGy; mean DLP 783 mGy*cm) (Tab.1).

Tab.1

	CTDIvol (mGy)	DLP (mGy*cm)
Our 128-slice CT	7,09	309,68
Public Health England review	8,5	783

Without any variation on protocol, we can deduct that this reduction on radiation dose must be associated with technological improvement. Renovation of CT apparatus and new iterative reconstruction are essential to adapt our practice, as radiologist, to ALARA principles.

Personal information

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