

# Computed tomography use in a large Italian region: trend analysis 2004-2014 of emergency and outpatient CT examination in children and adults

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## Purpose

To analyze Computed Tomography (CT) use in recent years in a high population density area in Italy (approximately 10 million inhabitants, including 1 million children), focusing on the developing age.

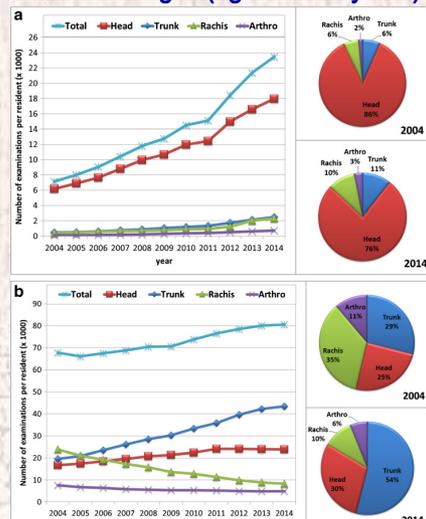
## Materials and Methods

Retrospective analysis of records from the Health Care IT System, covering more than 400 hospitals and clinics. Description of CT use between 2004 and 2014 in emergency and outpatient care and assessment of the radiation exposure trend.

## Results

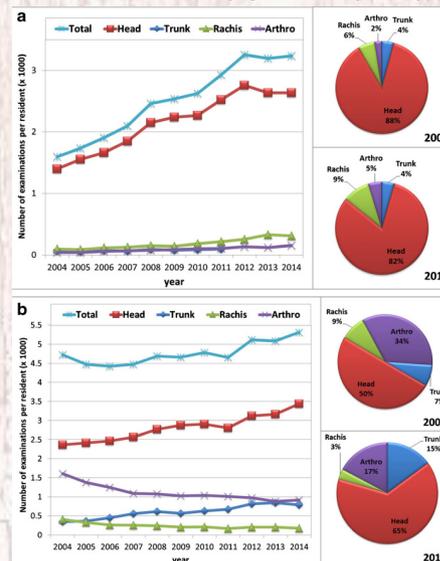
Over 9 million scans were performed. Emergency procedures showed a global increase of 230%, which mainly consisted of Head exams. In the global outpatient setting, the annual number of CT scans per person increased approximately 19%. A moderate increase in CT exams was observed in the developing age population, while a remarkable increase in Dental, Chest and Abdominal procedures occurred within the 10-30-year age range. The increase in the mean annual dose per caput in the global patient pool was approximately 42%, increasing from 0.72 mSv to 1.03 mSv. The population rate that received an annual radiation dose per caput from CT higher than 1 mSv tripled in the 11-year interval, increasing from 16 to 48%.

### Patients of all ages (ages 0-100 years)

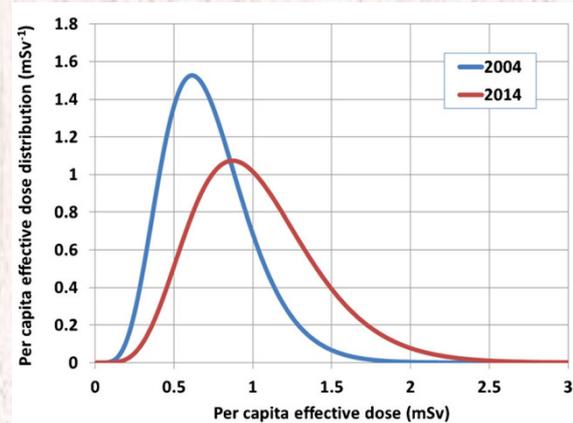


Emergency CT (a) and outpatient CT (b) procedures performed from 2004 and 2014 in Lombardy.

### Paediatric patients (ages 0-17 years)



Emergency paediatric CT procedures (a) and outpatient paediatric CT procedures (b) performed from 2004 and 2014 in Lombardy.



Distribution of the per capita effective dose due to all CT procedures performed in Lombardy in 2004 (blue line) and 2014 (red line)

## Conclusions

The outcomes raise a special concern for teenagers and young adults, taking into account that the widespread use of CT represents probably the single most important achievement in diagnostic radiology. The increase in CT use and in the CT-derived radiation dose in the population is occurring in spite of the evidence of the substantially improved carcinogenic potential of low doses of X-ray radiation, particularly for children. In contrast with several published investigations, which underline the radiation risk for paediatric age, the level of detail of the data processed in this study highlights a remarkable increase in the irradiation of teenagers and young adults, whose risk tends to be underestimated.