

Cumulative radiation dose in long stay critically ill patients on a cardiothoracic intensive care unit. A radiation safety issue?

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Introduction

Long stay critically ill patients on a cardiothoracic intensive care unit (CTCCU) often undergo repeated radiographic examinations. Morbidity associated with repeated exposure with radiation, especially in paediatric cardiac patients is well documented. However, little literature exists in adult cardiac surgical patients.

Maximal allowed occupational exposure for nuclear industry workers is 20 mSv averaged over 5 years and no more than 50 mSv per year.¹

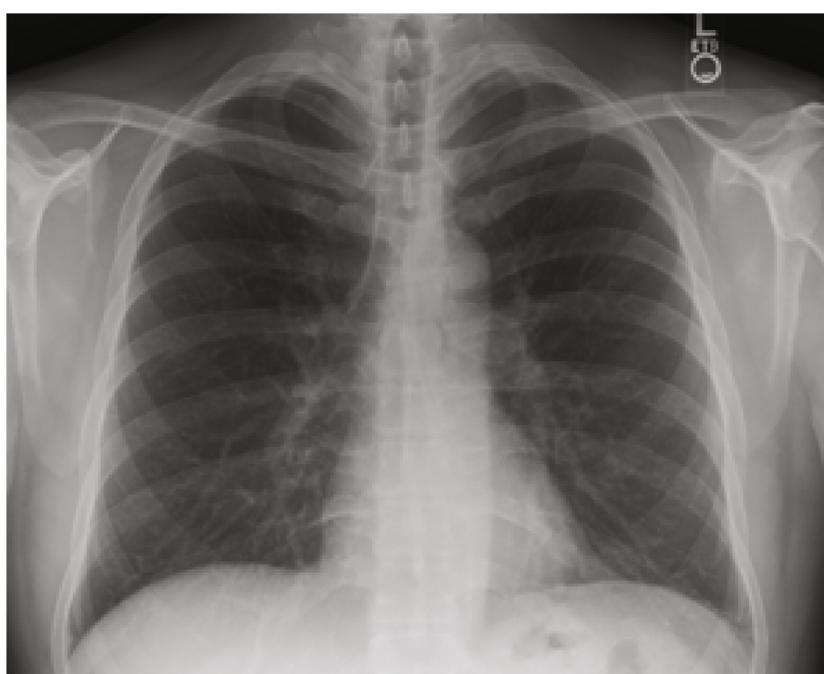
We hypothesised that long stay patient on CTCCU may exceed this limit.

Methods

Patients who stayed longer than seven days in our tertiary care cardiothoracic intensive care unit between September and October 2013 were identified.

Data was collected regarding demographics, number and type of radiographic examinations.

Average effective radiation dose was calculated using standard reference tables published by the Health Protection Agency, UK.¹



Results

Twenty patients were identified over a one-month period. Median age was 67.5 yrs (IQR 57-76.5). 12 (20%) were female. Median effective radiation dose was 0.18 mSv (IQR 0.1-10.2).

However, 4 (20%) patients exceeded 50 mSv radiation dose and 2 (10%) patients had radiation exceeding >100 mSv. 2 patients (10%) were identified to be under 18 years of age and had received an effective radiation dose of 38 mSv and 114.3 mSv respectively.

Discussion

Our results conclude that in our cohort, the median effective radiation dose in long stay critically ill remains mostly low and within safe limits. However analysis reveals that 30% of patients, the radiation dose far exceeds levels of safety. Two patients in our cohort received >100 mSv from diagnostic radiation were. Above doses of 50–100 mSv (protracted exposure) or 10–50 mSv (acute exposure), direct epidemiological evidence from human populations demonstrates that exposure to ionizing radiation increases the risk of some cancers.²

Adolescents are especially vulnerable to this effect. In our cohort, two patients under 18 had a high effective radiation exposure (>50 mSv). CT imaging and chest radiography to confirm line & NG positioning contributed the most exposure. This study demonstrates that we must ensure that radiological investigation are carried out judiciously, following the 'as low as reasonably achievable' (ALARA) principles of radiation safety.³

References

- 1 www.hpa.co.uk/topics/understandingradiation.
- 2 David Bennett *et al*. PNAS November 25, 2003 vol. 100 no. 24 13761-13766.
- 3 www.nrc.gov.