Radiation exposure among medical professionals working in the Intensive Care Unit

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Background and Aims: With the expanding use of diagnostic and therapeutic radiological modalities in critically ill patients, doctors working in Intensive Care Units (ICUs) are increasingly exposed to ionizing radiation. This risk of radiation exposure occurs not only during bedside radiologic procedures, but also when ICU physicians accompany patients to radiology suites. The aim of this study was to quantify levels of radiation exposure among medical professionals working in the ICU. Materials and Methods: The study was carried out prospectively over 6 months in the ICU of a tertiary-referral cancer hospital. Two teams consisting of 4 ICU resident doctors each were instructed to wear thermoluminescent dosimeters (TLDs) during their duty shifts. Standard radiation protection precautions were used throughout the study period. TLDs were also placed in selected areas of the ICU to measure the amount of scattered radiation. TLDs were analyzed at the end of every 3 months. Results: The readings recorded on TLDs placed in the ICU were almost immeasurable. The mean value of residents' radiation exposure was 0.059 mSv, though the highest individual reading approached 0.13 mSv. The projected maximum yearly radiation exposure was 0.4 mSv. Conclusions: If standard radiation safety precautions are followed, the cumulative radiation exposure to ICU resident doctors is within permissible limits and is not a cause for concern. However, with the increasing use of radiological procedures in the management of critically ill patients, there is a need to repeat such audits periodically to monitor radiation exposure.

Keywords: Dosimetry, Intensive Care Unit, occupational exposure

Introduction

Radiological investigations and therapeutics have become an integral part of the management of critically ill patients in the Intensive Care Unit (ICU). Patients admitted to the ICU routinely undergo bedside imaging procedures such as chest radiographs for diagnosing heart, lung and other pathology, and for confirmation of the position of devices like endotracheal tubes, nasogastric tubes, central venous catheters and intercostal drains. A review article has suggested that among ICU patients, up to 65% of daily chest radiographs and 70-75% of chest computerized tomography (CT) scans reveal significant or unsuspected abnormalities that may lead to a change in the patient’s management.¹,² Further, critically ill patients are frequently transported to the CT scan as well as digital subtraction angiography suites for diagnostic and therapeutic procedures such as angiography, embolization and stenting. In most situations, the ICU team is responsible for the transport and management of the patient in the radiology department for these procedures. This can significantly increase the cumulative radiation exposure to ICU personnel. There is, therefore, potential radiation exposure to healthcare workers, particularly for those working for long periods of time in the ICU. Epidemiological data indicates that the exposure to even low-dose radiation may be a cause for concern because such exposure can result in leukemia, thyroid malignancies and other cancers.³,⁴ Nonneoplastic effects of radiation include genetic mutation and...