1) Introduction

In 1966 a study group of ICRP and ICRU established by UNESCO used methods for evaluating the exposure of man to ionising radiation arising from medical exposures. The group rejected the universal recording of doses from diagnostic radiology for the entire population due to:

- Excessive cost
- Difficulty in obtaining dose values

Assessment and management of resulting data

The time is now ripe to re-evaluate the feasibility of undertaking patient dose assessments for the whole patient population as a routine aspect of an x-ray examination protocol given the technical advances that have taken place in the intervening period.

This paper will describe methods for undertaking patient dose assessments for every x-ray examination by employing information available from electronic patient examination records

The system that has been investigated employs electronic examination records either from a hospital’s Radiology Information System (RIS) or from PACS by means of DICOM header examination details included within the digital image data set. The RIS data is relatively easy to collect but has been shown to contain errors due to the nature of data recording.

By comparing the statistical profile of the RIS data with the profile of equivalent records from the PACS by means of DICOM header examination information, which is known to be correct, the RIS data set can be calibrated using various statistical filtration methods and verified as accurate for the purpose of patient dose audit.

The exposure parameter data can be then combined with x-ray tube and generator calibration data already collected as part of quality assurance measurements in order to calculate the entrance surface dose (ESD). Alternatively, the dose-area product (DAP) or for CT the examination DLP can be used directly.

2) Method

The RIS & DICOM data sets showed good correlation in terms of record-for-record comparison, the difference in the mean value and the mean difference of the quartile values. Table 1 shows the comparisons for three common radiographic examinations all rooms across a Trust.

The same comparisons have been made at individual room level for both DICOM and RIS for three examinations in 4 rooms across a single Trust.

Such periodic calibration also serves as an audit of RIS examination record accuracy & encourages staff to maintain accurate data entry. The aim of this work is to show that a DICOM calibration could replace the IPEM 88 recommended three-yearly audit with more regular RIS audits becoming the norm.

In conclusion, this method shows that RIS data can be used for audit purposes as long as it has been calibrated against a known correct data set. Data from the DICOM header of image data can be used as the known data set.

3) Results

Graph 1 is a histogram of the data sets for both DICOM and RIS for Chest examinations in 4 rooms across a single Trust.

4) Discussion

Due to the Trust-specific nature of the systems and sources of errors, a periodic calibration of the RIS data should be done at each Trust.

References: