General audit strategy using large scale diagnostic radiology examination data

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INTRODUCTION

During 2008 and 2009, a method was devised for the collection of large scale patient dose data through means other than manual collection by radiographers [1]. Data was collected directly from the hospital Radiology Information System (RIS) and entered into a bespoke database system [2] for analysis. Mean doses were then compared with national diagnostic reference levels [3,4], and local diagnostic reference levels could be established.

Preliminary studies showed that although further work would be required with the data, clinical audit would be possible [5] and perhaps level A Quality Assurance (QA) tests would be possible. This paper will show how all the components from data collection to reporting of patient dose, clinical and QA audit fit together and would operate over a large number of hospitals, even at national or international level (Figure 1).

METHOD

Whilst provision of data from RIS is a valid and working approach, it has been found that there is still the human element entering the data. For example, from a total of 58815 data records submitted, it was noted that 14.2% were of insufficient quality to audit further. This lead to the investigation of data from other sources. Other studies have shown that data can be retrieved from the DICOM header of an image [6] and this method is currently being trialled in the North West of England.

Before data is entered into the database, it is error checked against a number of criteria. The first criteria is to confirm that all the basic data that is required to perform a patient dose audit is included [7]. In the case of RIS data, the statistics for the number of incomplete records can be reported to the department as part of clinical audit. A second form of filtration is then used to remove records where data is present but is clearly in error. A two stage approach is used whereby an upper limit of kV and mAs is chosen based on generator practicalities, and then Chauvenet’s criteria [8] is used to further refine the data. Again, the statistics are reported back to hospital management.

Preliminary and as yet unpublished work indicate that the data can also be used to fulfill national quality assurance requirements. Clinical examinations have been mapped to the equivalent QA test from IPEM 91 with the data from those examinations used as an indicator of equipment performance.

CONCLUSION

With this system in place, a number of large scale audits are possible that employ actual patient data. Use of DICOM will remove human element but where the human element cannot be removed, it is possible to audit the actual data entry process. QA is possible using the patient as the phantom. All of this will help medical physicists underpin radiology and demonstrate compliance with UK regulations [10,11].

Figure 1 – Flowchart of data from hospital systems to audit reports

Figure 2 – Flowchart showing data across multiple sites

Following filtration, the data can then be used to perform patient dose audits both for comparison with national diagnostic reference levels and the establishment of local diagnostic reference levels. This has successfully be trialled in the North West of England [9] and a current study of 731,653 records is under way in addition to the service being rolled out to North Lincolnshire. A major RIS supplier in the UK has also been approached to collaborate in rolling this service out to a large number of hospitals in the UK by supplying data directly (Figure 2).

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