Improved patient safety, radiation protection and efficiency

St Helens and Knowsley Teaching Hospital NHS Trust (STHK)

Background

The establishment of local diagnostic reference levels (LDRL) is a requirement under IR(ME)R 2000 which, at STHK has historically been produced using retrospective data derived from exposure factors taken from the HSS Radiology Information System (RIS) . This manual method was time consuming and labour intensive and the team wanted the data to be absolutely clinically safe.

STHK were looking for a system that was able to collate dose data in real time, to produce LDRLs and alert them to any instances of overexposure. The radiology department decided to trial HSS DoseMonitor a commercial dose estimating software.

> "Using a dedicated IT solution to determine DRLs has significantly improved the way that we work and we believe it to be more clinically safe."

> "After the successful trial we could not envisage returning to the manual process."

Introduction

STHK provides a full range of acute healthcare services across two sites at Whiston and St Helens hospitals, with a workforce of over 7,000 staff. The radiology department had read the COMARE 16 report on the increased use of computed tomography (CT) in the UK, which included recommendations for healthcare professionals , and advised the Department of Health (DoH) about the increased radiation dose issues resulting from the use of diagnostic CT scans within the UK. With this in mind, the department began to trial the software.

Deployment of DoseMonitor pilot

STHK chose to include all three of its CT scanners and a sample of DR X-ray rooms for the trial. This choice of equipment provided a dose comparison across examination, room, site, modality and manufacturer. The Trust's IT department worked closely with HSS / PACsHealth and the department to set up the hardware and provide access to the system.

Lynn Anslow (PACs/RIS Manager) explains: "DoseMonitor is integrated with PACS rather than RIS, data is mapped from the DICOM headers in each modality to DoseMonitor. To minimise any effect on PACS performance it was decided to integrate to the PACS backup server with a general forwarding rule to send all data to DoseMonitor. This was then filtered by PACs Health".

"Body part mapping in the initial phases of the testing required some manipulation of data to ensure the correct data was mapped to the relevant fields in DoseMonitor. This was achieved using test patients' data".

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Training and deployment

Following the training delivered by PACs Health to the team, the live feed from PACS to DoseMonitor was switched on with data from the previous three month period uploaded onto the database.

For Plain film, the team decided to use this data within the analytic tool and filter by exam and room to produce the mean dose for each examination in each room.

Notification levels using the 90th percentile of the dose were then established for each examination, an alert email was sent to the pilot group team by DoseMonitor, so that the breach could be investigated and then allocated an acknowledgement reason/comment from a pre-determined list. Data from these notifications is easily exported for audit purposes.

> **"Patients' dose data is automatically fed into RIS from DoseMonitor, alleviating the need for manual dose input in post processing, reducing dose data entry issues."**

Lynn explains: **"We quickly realised that we had data for every patient which we could use to our advantage in a variety of ways. We expanded the trial team to include the modality lead radiographers who used the data produced by the analytic module to their advantage whilst performing image quality audits."**

"We used DLP values in CT to base our notification levels on, rather than CTDIvol. This allowed us to compare new values with our historical DRL's calculated prior to Dose Monitor. Initially the five top examinations were set up and then added to once confidence increased in analysing and setting notification levels".

DoseMonitor acknowledgement reasons were expanded by the team distinguishing the CT reasons from the Plain film reasons, e.g. modified technique in plain film and scan repeated due to poor contrast opacification in CT.

Recommendations

Lynn explains: **"Easy and timely access to dose data from the CT scanners has enabled us to compare our doses and protocols and acquire optimisation. Using a dedicated IT solution to determine DRLs has significantly improved the way that we work and we believe it to be more clinically safe. After the successful trial we could not envisage returning to the manual process. Once we had configured the system we were suddenly receiving huge volumes of data, all of it really useful and positive.**

Another advantage is that by integrating these systems, patients' dose data is automatically fed into RIS from DoseMonitor, alleviating the need for manual dose input in post processing, reducing dose data entry issues."

DoseMonitor has been used for dose audits, producing LDRLs and monitoring doses month on month.

Availability of current large amounts of data has resulted in appropriate timely teaching in the basics of CT.

Conclusion

DoseMonitor automates dose data collection, and its functionality allows analysis in both quantitative and graphical formats enabling the Trust to manage patient radiation dose and comply with regulatory requirements in a timely and cost effective manner.

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