A preliminary study into performing routine tube output and AEC QA using RIS data

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Background

730,000 patient exposure records were been submitted for Patient Dose Audit purposes direct from Radiology Information Systems (RIS)

Is it possible to use this data to show performance of the x-ray tube or the AEC system?
QA Protocols (IPEM 91)

AEC QA

• Use patient equivalent phantom
• 70 to 81kV
• Compare post-exposure mAs and/or DDI to baseline
• Tolerance of up to 30%
• Frequency 1-3 monthly

Tube Output QA

• Some kind of dose indicator (Dosemeter, DAP)
• Select a number of commonly used exposure factors
• Compare value from dose indicator to baseline
• Tolerance up to 20%

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Mapping QA protocol to Clinical Practice (AEC)

- Use patient equivalent phantom
  Patient is a patient equivalent phantom 😊

- 70 to 81kV
  Mode kV value for Chest PA/Abdomen PA is 75kV 😊

- Compare post-exposure mAs and/or DDI to baseline
  Data contains post-exposure mAs...
    ...but not a DDI 😞

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Mapping QA protocol to Clinical Practice (Tube Output)

• Use some kind of dose indicator
  DAP is an acceptable dosemeter.

• Parameters
  Mode parameters for Chest PA/Abdomen PA are:
  
  90kV/3.2mAs  78kV/32mAs

• Compare to baseline
  Data contains DAP...
  ...but quality of data is not always good.

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## RIS AEC Results

**HOSPITAL A**
**Room 1**
**Chest PA**

All records at 75kV

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<th>Month</th>
<th>Records</th>
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<th>Quarterly mAs</th>
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mAs values for Chest PA exams using AEC in Hospital A Room 1, when using 75kV
mAs values for Abdomen AP exams using AEC in Hospital A, Room 1, at 75kV
mAs values for Abdomen AP exams using AEC in Hospital A, Room 2, at 75kV
## RIS Tube Output Results

### HOSPITAL B Room AED4

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<th>XR Foot Rt</th>
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<td><strong>264</strong></td>
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</table>
Normalised output over time for room AED4 from routine QA results

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Normalised averaged DAP value per month for two examinations

XR Abdomen
XR Chest
Normalised output over time for room AED1

- Exposure 1
- Exposure 2
- Exposure 3
- Exposure 4
- Remedial
- Suspension
- Surveyed

Normalised Outputs

mm/yy

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Discussion

AEC PERFORMANCE CAN BE MONITORED MONTHLY OR QUARTERLY USING REAL PATIENT DATA

• Out of 9 rooms over 2 hospital sites, RIS data & QA data are within 30% of baseline for 7 rooms
• Tube output is still being analysed due to quality of DAP values

ANALYSIS OF DATA FROM RIS IS STILL TAKES MEDICAL PHYSICS EXPERTISE

• Process is still long and not as efficient as Radiographer QA
• DAP values require much statistical analysis

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Discussion

WILL QA ANALYSIS VIA RIS REDUCE AWARENESS OF QA FOR RADIOGRAPHERS?
• Is making QA remote from the radiographer a good thing?

WHAT WILL BE THE MANAGEMENT STRUCTURE OF THIS SYSTEM?
• If this were to be implemented, there would have to be a robust system of QA management, feedback to departments, data collection & monitoring baselines.
The Future

• Extend the study. More sites, more rooms
• Find rooms where performance is known to be poor
• Improve the analysis process
• Build a management structure including feedback mechanism
• DICOM, I must mention DICOM!

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Jason Fazakerley

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