The role of the medical physics expert during the implementation of a dose management system

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Introduction

Dose management systems (DMS) are useful tools to automatically collect and analyze patient radiation doses. They provide the possibility to medical physics experts (MPE) to easily detect abnormalities and optimize exposure, without spending time and energy in collecting data. More and more hospitals are installing these tools to either fulfill legal requirements or improve quality in radiation management. Frequently, the MPE are the only professionals that understand the whole chain from law and informatics to medical physics and clinical application. Thus, they may participate to the implementation of the dose management system not only as key user, but also as consultant, project manager or a combination of the above. The aim of this work is to present the typical steps in the implementation of a DMS and examine the role and responsibilities of the MPE in each of these steps.

Methods & results

This method outlines our approach to implement a new DMS in our hospital, based on HERMES methodology (1). The methodology proposes four-phase process: 1) initiation, 2) conception, 3) implementation and 4) deployment. For clarity reasons, conception and implementation were further divided into two steps, as illustrated below. A new title that defines each step is given in bold. Important points that were treated in each phase are listed. Other points can be added according to the structure and needs of each hospital or clinic. The arrow between the flow summarizes the skills an MPE needs to have to complete the task.

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1. Initiation

- Why
  - Stakeholders
    - MPE
    - Radiologists
    - Radiographers
    - Others (quality manager, biomedical engineers, directors, etc.)
  - Economic analysis
  - Legal framework
    - Radiation protection
    - Sensitive data

2a. Definition

- Who and what
  - Team creation
  - Definition of roles in the team
  - Risks for the project
    - Probability
    - Impact
    - Countermeasure
  - Evaluate and choose a DMS
    - Product aspects (radiation dose, image quality, modalities, workload)
    - IT aspects
    - User-friendliness
    - Financial aspects
    - Tender

2b. Planning

- When and how
  - Time planning for each team member
  - Modalities prioritization
  - Connection DMS with modalities
    - Direct connection
    - Via PACS
    - Mixed
  - Collected data
    - DICOM RDSR
    - MPPS
    - Other (OCR, manually, other DICOM objects, etc.)
  - Test concept/Migration concept
  - Archiving

3a. Execution

- Test
  - Installation in test environment
  - User access and rights
  - Quality assurance
    - Physics
    - Data communication, transfer, access
    - DMS functionalities
  - Configuration
    - DRLs
    - Alerts
    - Reports
    - Transfer to repository
  - Connection with other programs

3b. Control

- Go Live
  - Migration from test to production environment
  - Quality assurance in production environment

4. Follow-up

- Working with the DMS
  - Training of final users
  - Management of future issues
  - Final project analysis
    - Modalities connected
    - Problems encountered
    - Future actions
  - Team resolution
  - Data analysis
  - Application of dose indicators
  - Feedback

Bibliography


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