European education program for inspectors

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HERCA workshop in Brussels
October 6-8, 2015

2014 – 2016, coordinator of the EUTEMPE-RX courses for physicists in radiology

Introduction

"competent authority" means an authority or system of authorities designated by Member States as having legal authority for the purposes of this Directive; "inspection" means an investigation by or on behalf of any competent authority to verify compliance with national legal requirements;

"radiation protection expert" means an individual or, if provided for in the national legislation, a group of individuals having the knowledge, training and experience needed to give radiation protection advice in order to ensure the effective protection of individuals, and whose competence in this respect is recognised by the competent authority;

"medical physics expert" means an individual or, if provided for in national legislation, a group of individuals, having the knowledge, training and experience to act or give advice on matters relating to radiation physics applied to medical exposure, whose competence in this respect is recognised by the competent authority;

"practitioner" means a medical doctor, dentist or other health professional who is entitled to take clinical responsibility for an individual medical exposure in accordance with national requirements;

"other professionals carrying out practical aspects of medical radiological procedures", such as radiographers and technicians in radiodiagnostic medicine, nuclear medicine and radiotherapy.
Common challenges

• Justification & risk assessment
• Optimization of dose and image quality
• Dose limits
& others

Examples of Justification & Risk Assessment

• New technology on the market
  • Ex: PET-MRI
• Candidate technology for screening
  • Ex: breast tomosynthesis, breast CT, virtual CT colonoscopy, ...
• Wide spread use of ionising devices
  • Ex: CBCT in the dental practice
• “Photo equipment like devices” using X-rays
  • Ex: portable, hand held dental x-ray devices
• Old equipment still in use

Advice – Guidance – Acceptability Criteria - ...

Examples of Optimization (part Dose)

• Collection of Diagnostic Reference Levels for common exams
  • Will require data processing and organized feedback
• Diagnostic reference levels for less common exams
  • Ex: pediatric
  • Ex: interventional procedures
• International confrontation or harmonization
  • Please don’t strive for Europe harmonized DRLs, but rather technology or application specific DRLs, the lowest dose is not the best dose!
• Difference between Diagnostic Reference Levels and patient specific dose

Data collection, work with the data & action

Examples of Optimization (part Quality)

Evolution:

• From the quality of film to (processed) digital images
• From ‘line pair counting’ to ‘contrast –detail’
• From subjective measures to computerized measures
• From 2D to 3D
• From plain images to image analysis & new reconstruction techniques

Understand the priority that image quality is crucial
Support objective task based optimization

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Dose limits (personnel)

• Doses potentially high and increasing
  • Ex: interventional radiology and cardiology
  • Ex: CT guided biopsies
  • Ex: CBCT in Ok, in the ambulance, ...
• New dosimetry techniques
• Monitoring
• Computer model to better approximate eye lens dose, etc.

Benefit from technology insight, monitoring, ...

Other technical challenges

• Clinical audits & inspection of the working procedures
• Nuclear safety culture in hospitals
• Accident and incident reporting in hospitals
• Teaching and education in hospitals
• Patient dose passports

Benefit from technology insight, monitoring, ...
Other (human) challenges

- The medical environment, the medical language, the medical challenges, the medical laws & Medical Physics Experts rarely available
- Rapidly changing technological situations, yet intrinsically very conservative technical world
- Physics & radiation protection is not a first priority
- A hospital is not a nuclear power plant

Many common challenges:
How to improve the nuclear safety culture in radiology departments?

A chain is said to be only as strong as its weakest link

Tasks for the nuclear authorities (viewpoint of the hospital physicist)

Play your role. It makes a difference!

- Continuous update of acceptability criteria & protocols
  - Vendor or applicant – neutral advice ... ‘even if their systems are the best’
  - Allow screening only if justified; allow it if justified
  - Justification using objective criteria
- Organize DRL data collection, data processing and feedback
- Guide clinical auditing
- Certify the proper RP courses, CPDs, ...
- Personnel dosimetry supervision

Common challenges & a solution: training & education with common targets

Apply proper Acceptability Criteria - ...
DRL Data collection, work with the data & action
Objective task based image quality optimization
Technology insight, Personnel dose monitoring, ...

-> current challenges, mostly under development & research
-> training & education at EQF level 8

EUTEMPE-RX solution

- Successful application to the 2012 FP7 EC call for Euratom Fusion Training Schemes (EFTS) in ‘Nuclear Fusion, Safety and Radiation Protection’ (score of 14.5/15)
- EU support: € 1,658,000
- Timing: 3 year project: 01/08/2013 - 31/07/2016

- Most EC member states don’t have the capability to provide such a high-level course
- Expertise is spread all over Europe
- A proper environment is needed:
  - Access to high end software, systems and applications
  - Access to prototypes and pre-clinical systems
  - Teachers
- Cherry picking !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

-> 12 Course Modules developed by a European network of 14 experts
Objectives
1. To provide a modular training scheme for the MP in Radiology to reach EQF level 8
2. To set up a multicampus Education combining online with face-to-face learning
3. To serve as a model for harmonised courses across Europe and get accredited (by EFOMP)
4. To achieve excellence in:
   • module content and organization
   • fulfillment of participant supported quality objectives
   • participant and stakeholder satisfaction

Participants
• Target group:
  • The MP in hospitals (D&IR)
  • The MP, engineers & scientists in industry
  • The MP, … in regulatory authorities
  • (PhD students in physics for radiology)
  • (Medical Engineering)
• From all Member States of the EC
• With a gender action plan
• Entrance requirements:
  • EQF level 7 = master + 2 years experience (in D&IR)
  • CV

Course Modules

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<td>Development of the profession and the challenges for the MPE (D&amp;IR) in Europe</td>
<td>C. Caruana &amp; E. Vano</td>
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<td>2</td>
<td>Radiation biology for medical physicists in radiology</td>
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<td>3</td>
<td>Monte Carlo simulation of X-ray imaging and dosimetry</td>
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<td>Advanced X-ray physics for imaging devices and user protocol innovation in D&amp;IR</td>
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<td>The development of advanced QA protocols for optimized use of radiological devices</td>
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<td>7</td>
<td>Advanced measurements of the performance of X-ray imaging systems</td>
<td>K. Young &amp; A. McKenzie</td>
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<td>Role of the medical physicist in CT imaging and patient dose optimization</td>
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<td>Achieving quality in diagnostic and screening mammography</td>
<td>R. van Engen &amp; W. Vedel</td>
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For more info: see quality manual

Course Modules

- Part 1: Online phase
  - e-learning platform
  - Web lectures, with ppt organized in a book structure; suggested reading; movies; audiofiles;
  - Interactive sessions: exercises, self-assessment, teacher feedback, discussion fora, etc.
  - ~40 hours of active participation over a longer period
  - Done from home

- Part 2: Face-to-face phase
  - (Lectures), demonstrations, exercises, discussions, hands-on workshops, practical sessions, etc.
  - ~40 hours of active participation
  - On location
  - Review of the course & Evaluation

Example: quick navigation

Example: Depositary of documents on the platform

Module 1, Prague
C. Caruana & E. Vano
‘European course for …’

- Sustainability plan being made...
- Would definetely sustain if ‘given value’ by HERCA
- Would benefit if we reached more potentially interested candidate participants
- Would definetely benefit from all PR (by HERCA)
- Would benefit from support by local authorities; may not survive without support
- Grateful for your comments, hilde.bosmans@uzleuven.be

It is all about building a future
Welcome to join!

Acknowledgement

• Nelis Van Peteghem (scientific secretary)
• All 14 project partners
• Scientific advisory board, with HERCA as an observer
• The Leuven educational & teaching team
• All participants to all the modules and to the mid-term workshop
• HERCA observers in our advisory board