Present and future challenges in radiation protection in a medical facility

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History

• 1997-2003: preclinical research at KU Leuven
  – First contact with radioactive sources (H-3, C-14)
  – Liquid scintillation counting
  – Radioactive waste

Contact person for the lab on lab safety and radioprotection
History

- 2004-2007: Project engineer
  - EFRO-project: Detection and prevention of radioactive contaminations in the environment (screening household/industrial waste at incinerator, recycling centre, hospital)
    - **Education** (protection against radiation, use of portal monitor, hand-held contamination monitors)
    - **Detection, isolation** and **identification** of radioactive sources present in the waste
    - **Administrative** follow-up
    - **Advise** (choice of equipment, writing work procedures, prevention policy and risk management)
History

• 2004-2007: Project engineer
  – Megaports project
    • **Supporting** the Belgian **customs** with portal monitor controls and the radiological study of container transport in the **harbour of Antwerp**
  
  – Continued education
    • Radioprotection medical **course of “helper”** (XIOS)
    • **Radiation protection expert training** (XIOS-SCK)
Present

- 2007- present: health physics expert at UZ Leuven

HDR brachytherapy  medical accelerator  cyclotron  radiopharmacy  medical imaging

new exciting applications and  …

nuclear medicine  radioisotope therapy  © UZ Leuven
Present

…and familiar ones

Contamination monitoring

Waste management
Present

- **Health physics tasks at UZ Leuven**
  - Management of installation-specific *licences*
  - **Research and control** of existing *protective measures* and *resources* concerning ionising radiation
  - Proposing complementary *protection resources* and adapted *working procedures*, in line with the needs of the departments concerned, while observing the **ALARA principle**.
  - **Facility designation, design and shielding**
  - **Reception and physical control** of new *appliances/sources* that transmit ionising radiation
  - **Research and preceding approval** of new or modified *manipulations, experiments, studies and treatments* using radionuclides/ionising radiation
Present

• Health physics tasks at UZ Leuven
  – Control of ordering/receiving/transporting packages containing radioactive material
  – Surveys and survey instruments
  – Contamination/Spill response
  – Incident analysis and follow-up
Present

- **Health physics tasks at UZ Leuven**
  - Oversee a record system to assure that the appropriate records are maintained in accordance with applicable regulations
    a) inventory and management of radioactive waste
    b) inventory and monitoring of radioactive sources and X-ray appliances/therapy appliances with ionising radiation
  - **Waste disposal**: return to authorized recipient/management of the internal stock of waste-by-decay record keeping, control measurements, calculation of released activities (effluents, airborne)
  - **Information sessions on radioprotection**
    a) General introduction for new employees (half-yearly frequency).
    b) Instruction of workers (annually)
  - **Personnel monitoring**
Organisational structure
• Organisational structure
Present

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Present

- structural link between health physics and users of ionizing radiation
  - Regular (every 2 to 3 months) consultation with important departments
    - Radiology
    - Radiotherapy-oncology
    - Nuclear medicine
    - Cathlab and Interventional Radiology
  
  Ad hoc consultation with the other medical departments, technical and logistic services, quality assurance, ....

- Participants
  - Health physics expert
  - Head of internal prevention service
  - Head of the department
  - Local coordinator radioprotection (head nurse)
  - Medical physicist
  - + others /specific per department (quality control, technical department, IDEWE, radiopharmacist, ... )
Present

• Agenda with fixed items concerning radioprotection
  – **Installation**-specific matters (machines, design, safety precautions, warning symbols, survey monitoring, ...)
  – **Personnel**-specific matters (dosimetry, training, working instructions, ...)
  – **Procedure**-specific matters (new guidelines, working and emergency procedures, ...)
  – **Licence**-specific matters (new applications, inventory, personal licences ...)
  – **Miscellaneous**

**Other structural committees**

• Preventiecel (internal committee on prevention) - CPBW
• Committee on radiation protection (including external experts)
Present

- **Daily job**
  - A never ending story, no dull moments
    - Very versatile, main focus on radioprotection
    - Interaction with variety of personnel: work floor up to management
    - From measuring waste to aid with installing and implementing new innovative/hightech techniques
  
- **Interaction with the work floor pays of**
  - Workplace analysis
  - Ownership in a safety culture

- **A lot of tasks….always a to do list**
Present

• Challenges
  – A small part in a large framework
  – Find a way to make your point
  – Communication skills

⇒ For radioprotection in medical facility
  • Use the systems of accreditation/quality to your benefit
  • Use the structures of the internal prevention service
  • Use the internal data and procedural management system

JCI – Muzlidoc – Peoplesoft logistiek/personeelsbeheer - GBS
Future

Challenges today and to come: “The Fast and the furious”

Technology in medical imaging evolves fast

- New hybrid medical imaging systems
  - PET-MRI-CT

- Mobile X-ray systems with higher dose rate
  - mobile CT
  - mobile medical accelerator

- Dose reducing techniques
Challenges today and to come: “The Fast and the furious”

New therapeutic treatments

- Radionuclide therapy
  • PRRT (Lu-177, Y-90)
  • Ra-223 dichloride therapy,…

- Proton therapy

Highly specialised treatment planning systems
Future

- Future challenges
  Objective: look after the collective dose through justification, optimization and safe practice in the field of medical practices

  Organizational level:
  - Identify tools for determining the best radiation protection practices
  - Risk communication

  Staff:
  - Safety education and training
  - Risk awareness and perception

  Equipment:
  - Implementation of dose reduction measures
  - Implementation of dose management and reporting tools,
    - diagnostic reference levels for interventional radiology
    - use of dose constraints and dose limits for personnel monitoring
Future

• Future challenges
  – Professionals working in the field need a forum where they can meet and discuss multiple aspects of radiation protection in medicine
    The rapid technological development within medical applications is challenging: new applications, procedures and equipment can appear in clinical practice before solid evidence concerning their clinical benefits and the risks they imply has been established.
    ⇒ Enhance the exchange of information on good radiation protection practices and define standards between competent authorities, professionals and manufacturers
    ⇒ Exchange of scientific and technical knowledge and of experience
  – Strengthen radiation safety culture in health care
    • radiation therapy (including planning and verification): external beam therapy, brachytherapy and metabolic therapy: prevention of incidents and accidents in modern radiation therapy – return of experience – lessons learned
    • Engage in stakeholder involvement (patients, medical and technical staff, health physics, medical physicists, manufacturers of radiological devices,…)
  – Strengthen manufacturers’ role in contributing to the overall safety regime
Thank you!

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UZ Leuven - radioprotectie

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GBS: Synoptisch bord
**JCI Standards**

**FMS.2** The organization develops and maintains a written plan(s) describing the processes to manage risks to patients, families, visitors, and staff.

**FMS.3** One or more qualified individuals oversee the planning and implementation of the program to manage the risks in the care environment.

**FMS.5** The organization has a plan for the inventory, handling, storage, and use of hazardous materials and the control and disposal of hazardous materials and waste.

**AOP.6.3 (V5)** Radiation safety program is in place, followed, and documented, and compliance with the facility management and infection control programs is maintained.