Catalan Clinical Audit
Network for Quality Improvement
in **Radiotherapy**

The role of the MPE

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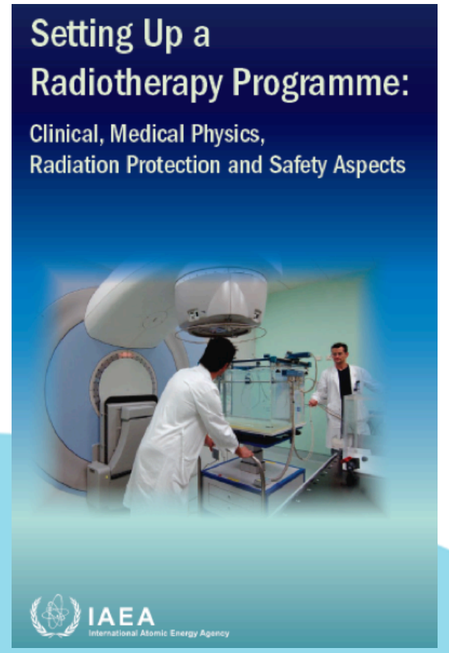
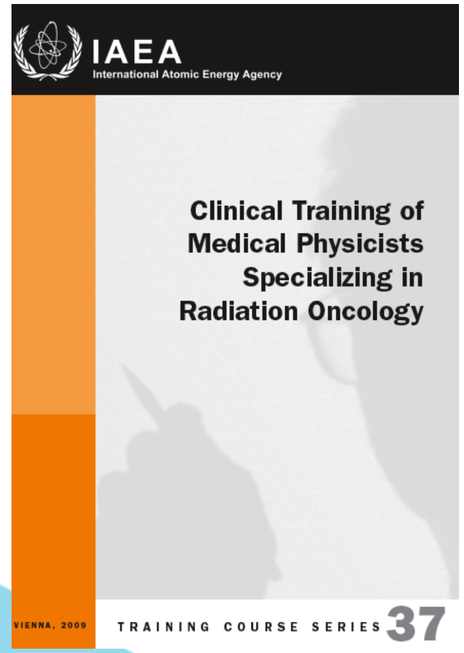
Objectives of the lecture

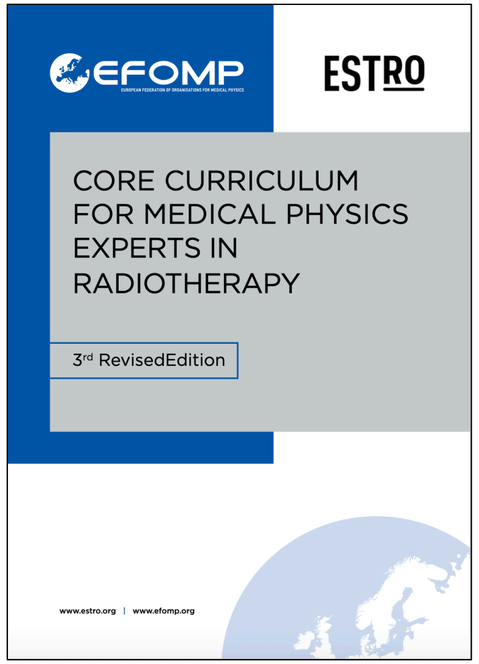
- The roles and responsibilities of an MPE in RT
- The role of the MPE in the audit team

The roles and responsibilites of the MPE in radiation oncology

The Medical Physics Expert in Radiation Oncology is responsible for the efficiency, quality and **patient safety**!







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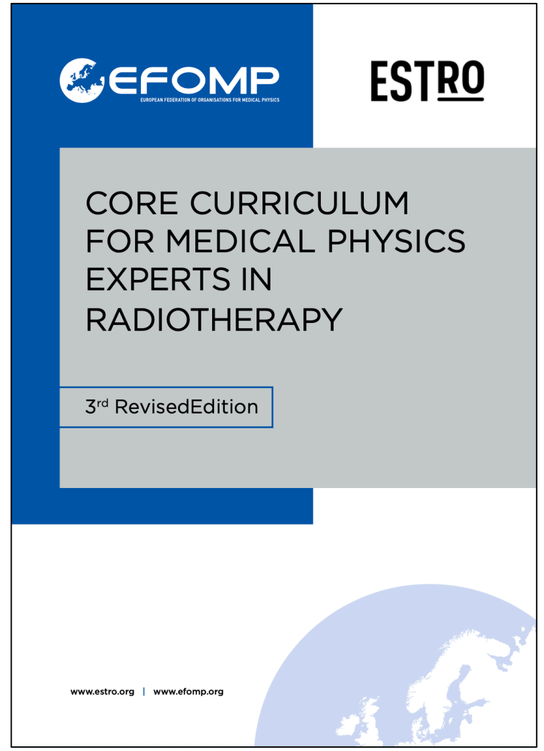
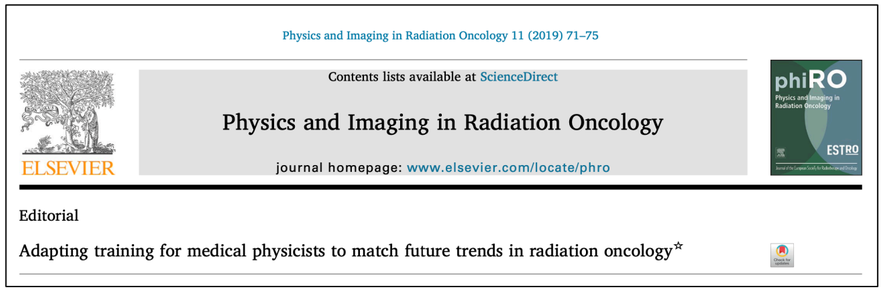
Training of the MPE in radiation oncology

A huge variation across European countries …

PRE-EDUCATION	EDUCATION AND TRAINING	MPE CERTIFICATION	CONTINUING PROFESSIONAL DEVELOPMENT (CPD)
BSc degree (predominantly in Physics) MSc degree (Physics or Medical Physics) = BSc + MSc (including in total at least 180 ECTS in Fundamental Physics and Mathematics)	• Duration of at least 4 years to obtain the competences (CanMEDS roles) to become an independent specialist • The trainee appointed as a paid resident Training in one or more subspecialties of Medical Physics • Training conducted in a hospital/healthcare facility accredited by the competent authority • Training facility and quality of the MPE training regularly audited by the competent authority	By competent authorities as MPE in Medical Physics speciality (one or more subspecialties)	following European guidelines




Physics and Imaging in Radiation Oncology 11 (2019) 71–75

Contents lists available at ScienceDirect

Physics and Imaging in Radiation Oncology

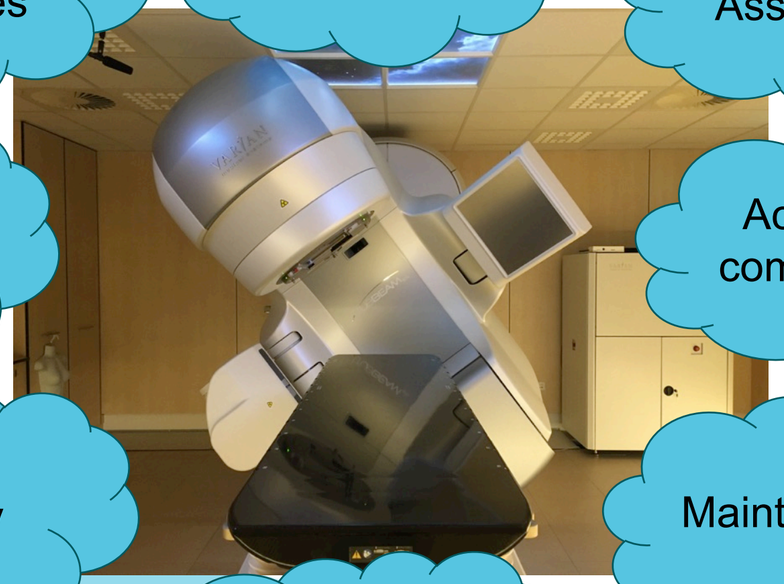
journal homepage: www.elsevier.com/locate/phro

Editorial

Adapting training for medical physicists to match future trends in radiation oncology☆

The roles and responsibilites of the MPE in radiation oncology

Typically equipment oriented …



Documented procedures

Safety

Quality Assurance

Treatment planning

Acceptance, commissioning

Dosimetry

Maintenance

Calibration

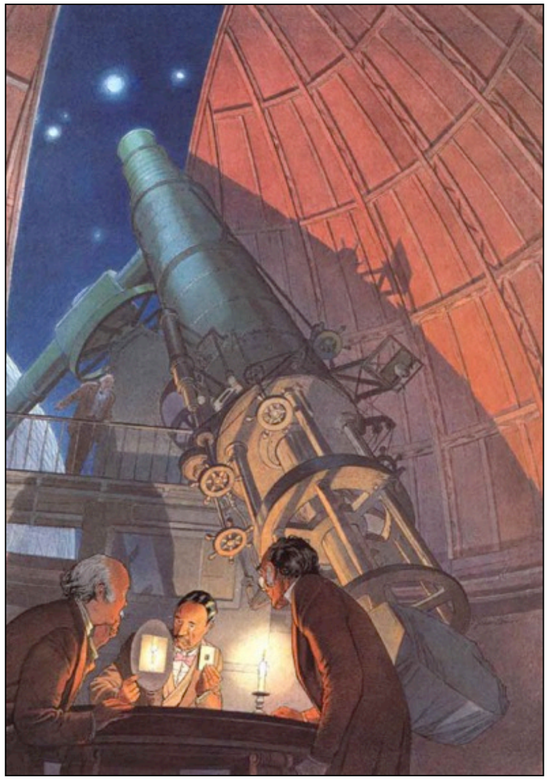
… and more

- IAEA
- Regulators
- Protocols
- Primary Standard Laboratories
- Companies
- …

The roles and responsibilites of the MPE in radiation oncology

But it's much more

- Ensure technology is used for the benefit of patient
- Ensure equipment is appropriate and safe
- Technology and beyond …:
  - Computing, scripting, and ICT issues in general
  - Prevention of accidents, pro-active risk analysis
  - Imaging: integration, QA, registration, …
  - Margins, patient set-up and motion management (IGRT-SGRT)
  - Up to date dosimetry and QA
  - Fast and safe uptake of innovative treatments
  - IMRT / VMAT / SGRT / SBRT / SRS /UHDR /ART /…
  - Brachytherapy/intra-operative radiotherapy/ TBI / TSEB /…
  - …
  - Training!
- The medical physics team is part of the RT-team … no strict boundaries



L' expérience cruciale, F. Schuiten

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The role of the MPE in the audit

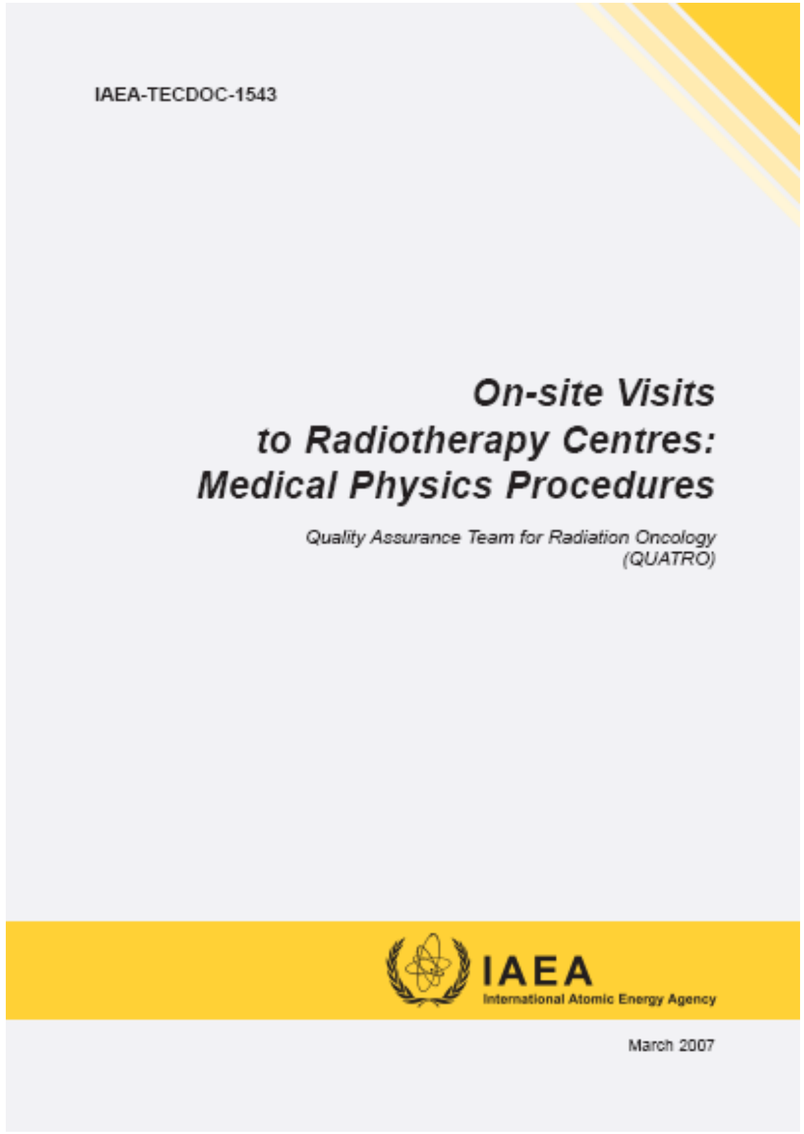
An interesting guide

I TECDOC 1543

II Physicists involvement in QUATRO
- Patient related procedures
- Equipment related procedures
- Assessment of training programmes

III Physical measurements within the program

IV Conclusions and tie in with the team



An interesting guide

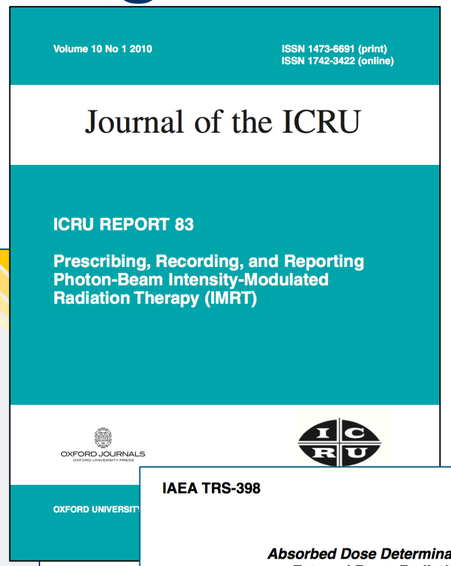
An interesting guide

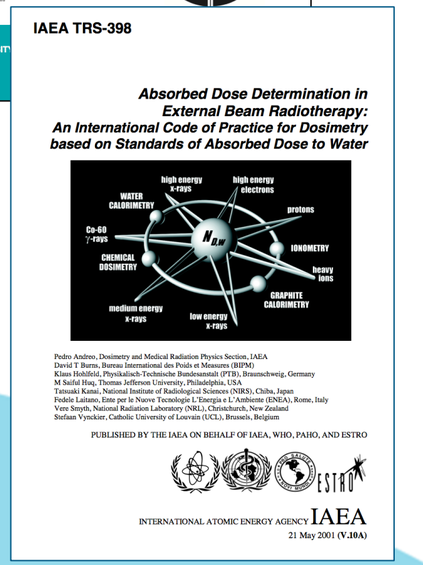
PART II. ON-SITE DOSIMETRY VISITS TO RADIOTHERAPY HOSPITALS

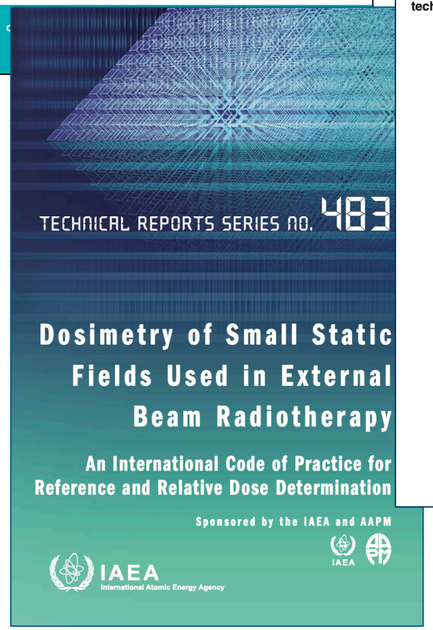
An interesting guide

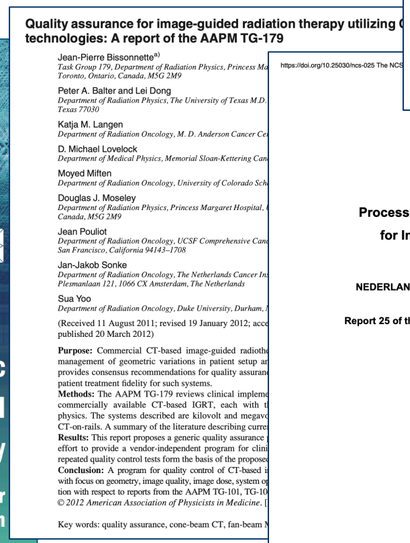
PART IV: ON-SITE VISITS FOR REVIEWING THE TREATMENT PLANNING PROCESS

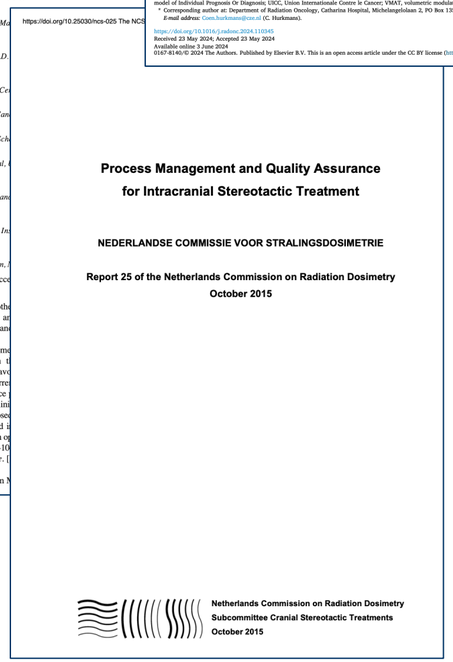
More interesting literature











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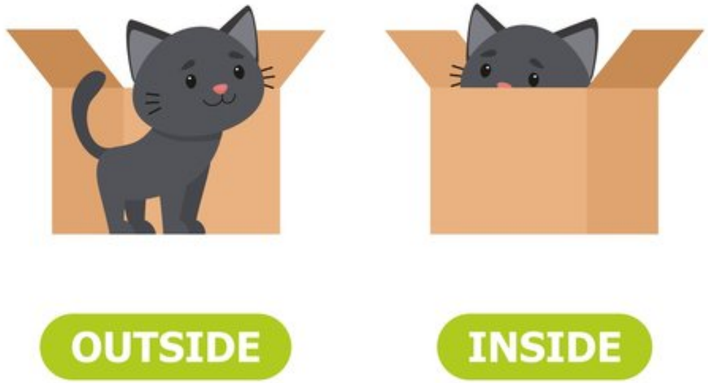
An interesting guide

Therefore an adequate level of QA, independent verification and quality audit are necessary for treatment planning as for other steps in the radiotherapy process. In particular, it may be noted that a similar safety philosophy of independent (redundant) checking should be applied to treatment planning calculations and processes as is recommended for all aspects of radiation treatments. Examples of these redundancies include:

(a) Dual monitor chambers, back-up timers, independent safety and interlocking systems, etc. in equipment design;
(b) Independent checking of beam calibration and external audit of beam dosimetry;
(c) The use of more than one measurement technique and the comparison of the sets of results in the measurements of beam characteristics;
(d) The comparison of input data to output at many levels in comparing the patient information in a computerised verification system;
(e) Independent checking of patient set-up parameters by more than one radiotherapy technologist;
(f) The use of *in vivo* dosimetry.

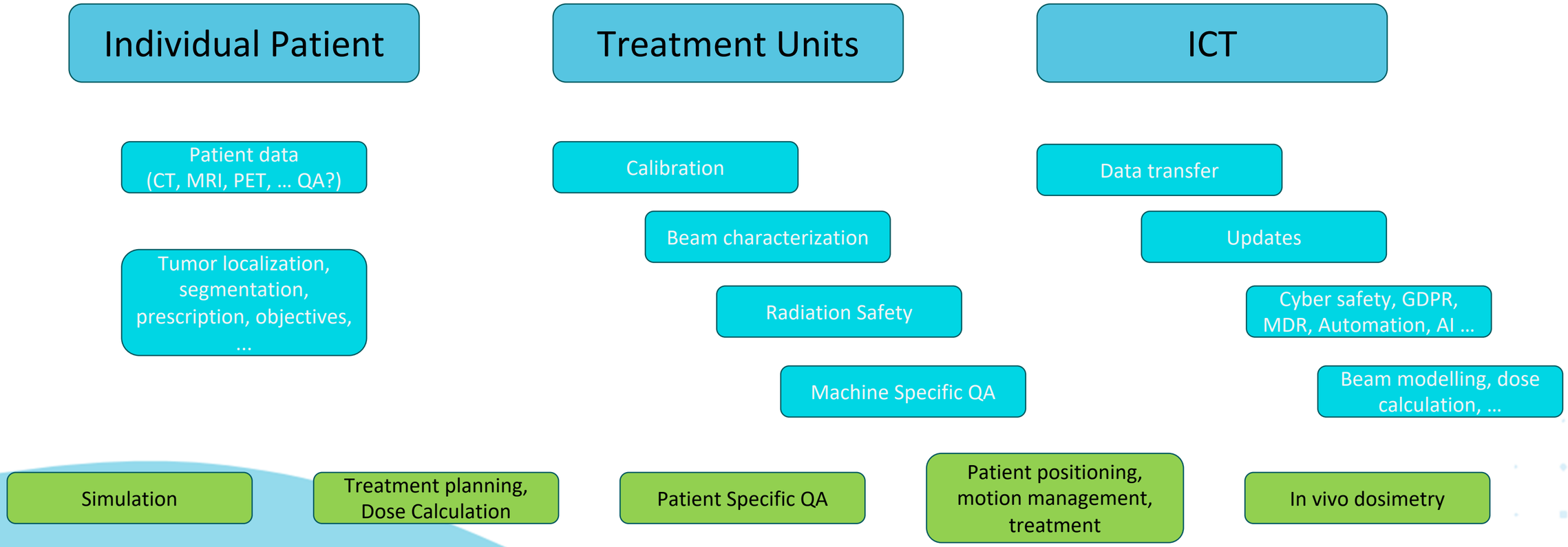
Practical considerations

- **It is important to interpret this with the facility to be audited in mind and with due consideration of the stated objectives of the audit.**
- **How is the Medical Physics Team Organized?**
  - Who are the members: MPE's, trainees, MPA's, engineers, ICT, …?
  - How is internal communication organized (structural meetings, agenda's, minutes, …)?
  - How are the tasks and responsibilities organized?
  - How is training organized?
  - Documentation and procedures: version management, action levels, …
- **How is the MP-team integrated in the RT-team?**
  - Communication flows
  - Structural interdisciplinary meetings?
  - Strategic meetings?
  - Patient safety, incident reporting, pro-active risk assessment?
- **How is the MP-team connected with stakeholders outside the RT department?**
  - ICT!
  - Technical departments and maintenance
  - Manufacturers and service of equipment
  - Medical imaging and nuclear medicine departments
  - …



Practical considerations

Follow the patient's care path: where and what is the MPE's role?



Practical considerations

Observations

Equipment:

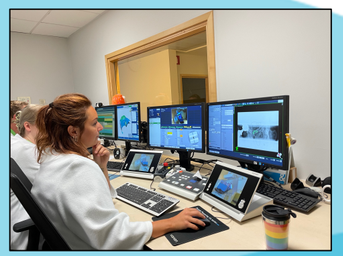
- Observe warm-up procedures
- Observe MSQA if possible
- Observe absolute dosimetry if possible
- Check QA-equipment (and QA of QA equipment)
- Verify trending, traceability, dosimetry audits, …

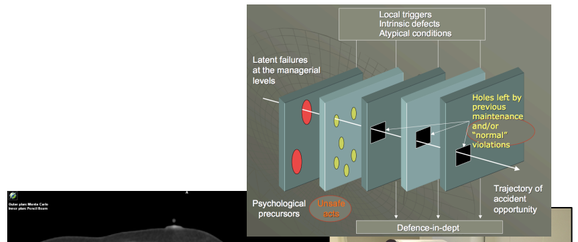
Treatment planning and treatment:

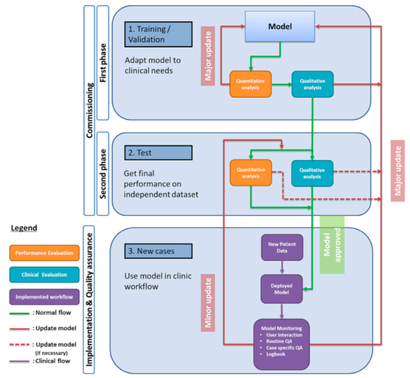
- Observe specific plans
- Verify PSQA flow (independent dose calculation, PSQA measurements, IVD: tolerances/action levels …)
- Observe simulation and treatments

Documentation / procedures:

- Check procedures and version handling
- Check QA documentation, analysis, trending, actions
- Procedures for maintenance and breakdowns
- QA scheduling
- …







Practical considerations

Observations

- Checklists
- Review of documentation
- Discussion with local staff
- Observation of practice
- Limited measurements

The purpose of this part of the audit is to get **an overview of the medical physics quality assurance processes, procedures, documentation and records**, as well as a sampling of the physics dosimetry data, to assess whether **all appropriate physics aspects are covered** and **properly implemented**.

* Dosimetry audits: see appropriate lecture

Practical considerations

Access to resources

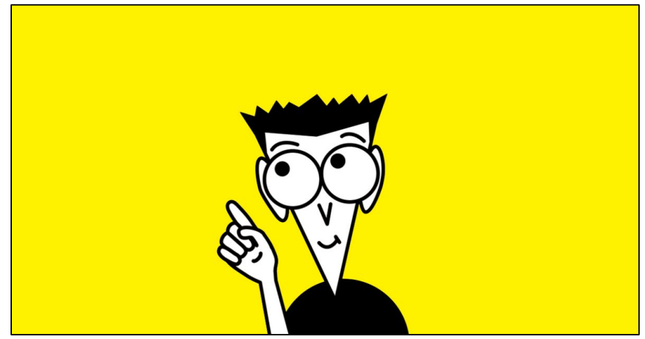
- Library?
- Internet?
- Colleagues?
- Conferences?
- Continual education, courses?
- Internal training, Journal Clubs?

Practical considerations

Research and clinical trials

- Not just a luxury, but an obligation towards the patients
- Physicists should be included in clinical trials
- Quality assurance is essential in clinical trials
- Helps with training
- Provides motivation
  (and possibly even additional resources through companies, universities, research grants, …)
- Improves quality and innovation

Summary



- Observe
- Follow the patient’s care path
- Verify if MSQA and PSQA are complementary (not redundant)
- Check communication, procedures, action levels
- Check integration/interaction (within department, with stakeholders)
- Check tracebality of dosimetry, external audits, incident reporting, FMEA, E2E testing, automation/scripting/updates, …

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