

2020 Joint AAPM/COMP Virtual Meeting

*Development of new affordable medical
physics technology for the developing
world*



**IAEA activities in imaging.
The success stories**

V.Tsapaki

Medical Physicist (Diagnostic Radiology)
Dosimetry and Medical Radiation Physics Section
Division of Human Health, IAEA

IAEA is an independent organization within the United Nations serving as the global focal point for nuclear cooperation worldwide

SAFECARDS

It carries out the IAEA's duties and responsibilities as the world's nuclear inspectorate, supporting global efforts to stop the spread of nuclear weapons.



NUCLEAR APPLICATIONS

It assists Member States to meet their development needs through nuclear science, technology and innovation.

NUCLEAR SECURITY

It aims to protect people, society and the environment from the harmful effects of ionizing radiation

NUCLEAR ENERGY

It provides technical support on the nuclear fuel cycle and the life cycle of nuclear facilities

TECHNICAL COOPERATION

It aims to support the use of nuclear science and technology to address major sustainable development priorities at the national, regional and interregional level.

NUCLEAR APPLICATIONS



It assists Member States meet their development needs through nuclear science, technology and innovation. It also works with laboratories, universities and research facilities worldwide

HUMAN HEALTH

It supports Member States' fight against cancer, cardiovascular diseases, malnutrition and other diseases using nuclear and nuclear-related techniques.



SEIBERSDORF LABORATORIES

8 laboratories that support and implement activities that respond to the developmental needs of Member and provide technical and analytical services..

ENVIRONMENT LABORATORIES

They use nuclear techniques to study the environmental impacts of radionuclides, trace elements and organic contaminants.

PHYSICAL CHEMICAL SCIENCES

It provides support to Member States in using nuclear methods for a variety of practical industrial applications.

RESEARCH

It manages research, technical and doctoral contracts , research agreements and Coordinated Research Projects

DIVISION OF HUMAN HEALTH



support of cancer radiotherapy treatment and diagnostic imaging projects, nutrition centres and human resource development. Development of guidelines; databases; providing a quality assurance framework and review missions; providing technical, advisory and dosimetry laboratory services; as well as educational and research initiatives.

DMRP

The Dosimetry and Medical Radiation Physics Section (DMRP) assists MS to work safely and effectively using radiation medicine.

It promotes and supports:

- QA programs
- quality improvement practices
- best practices in CI MP
- worldwide coherence in radiation dosimetry.

NMDI

The Nuclear Medicine and Diagnostic Imaging Section (NMDI) focuses on fostering the use of nuclear medicine and diagnostic imaging procedures in Member States for both diagnosis and therapy.



ARBR

The Applied Radiation Biology and Radiotherapy Section (ARBR) objective is to improve the availability and safe use of radiotherapy in IAEA Member States.

NUTRITION

Nutritional and Health-Related Environmental Studies Section This Section enhances the capabilities of Member States to combat malnutrition in all its forms and supports effective, evidence-based nutrition programming using nuclear and related techniques.

DOSIMETRY AND MEDICAL RADIATION PHYSICS SECTION



ACTIVITIES

ACTIVITIES

ACTIVITIES

Roles and responsibilities

Academic education

Clinical training

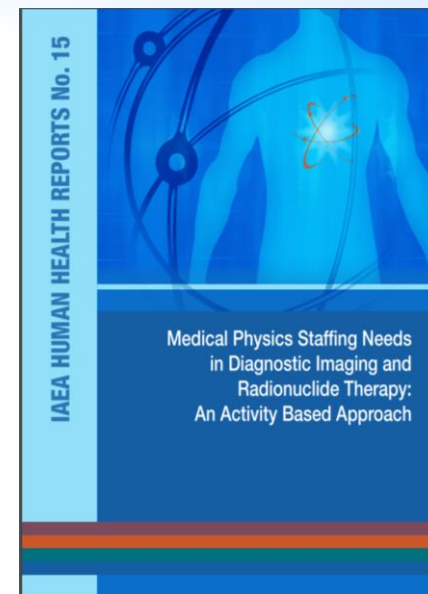
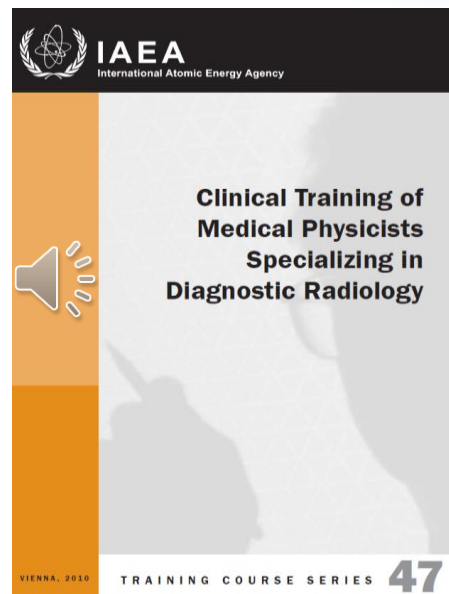
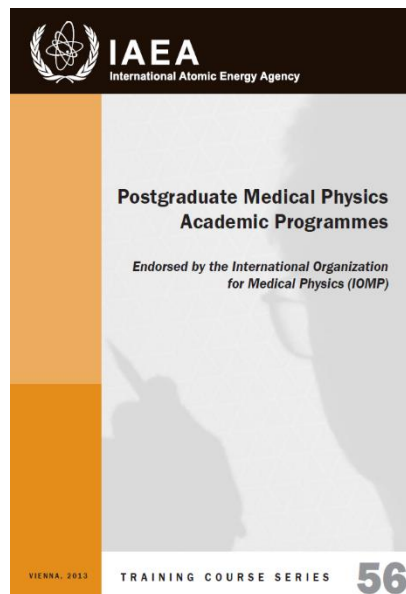
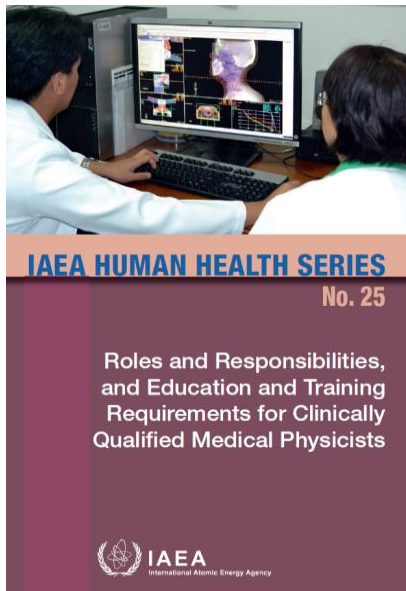
Guidelines

Research

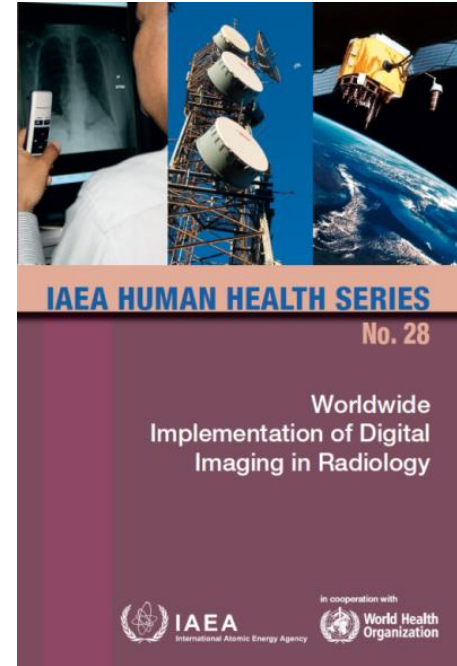
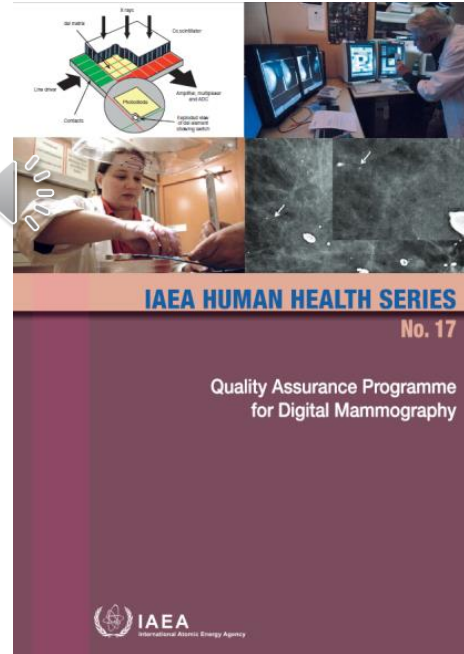
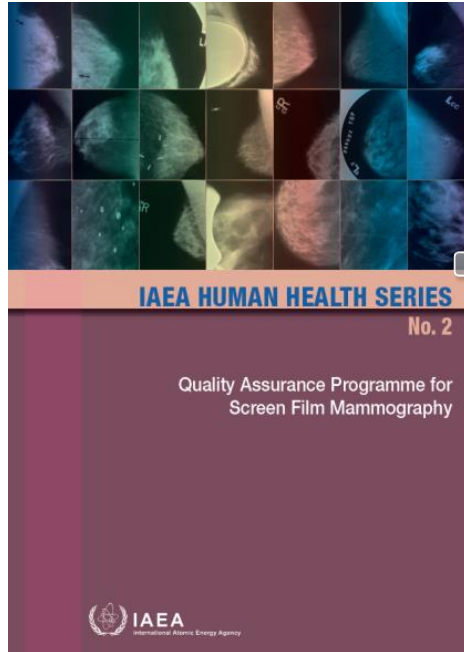
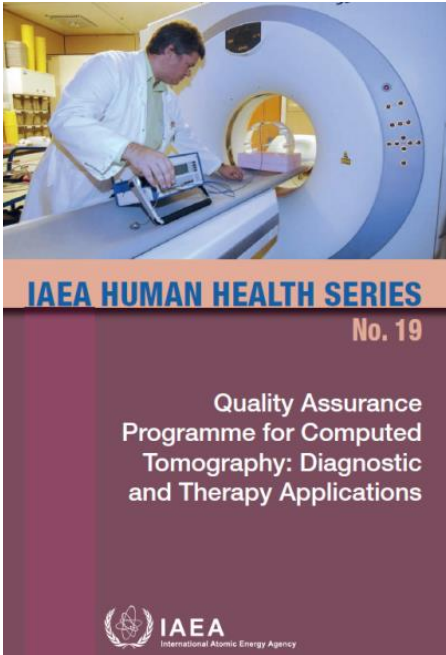
Technical cooperation



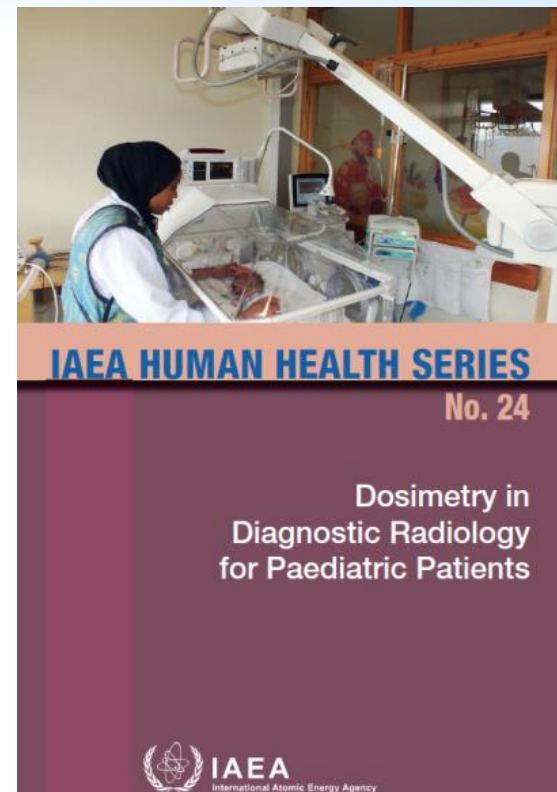
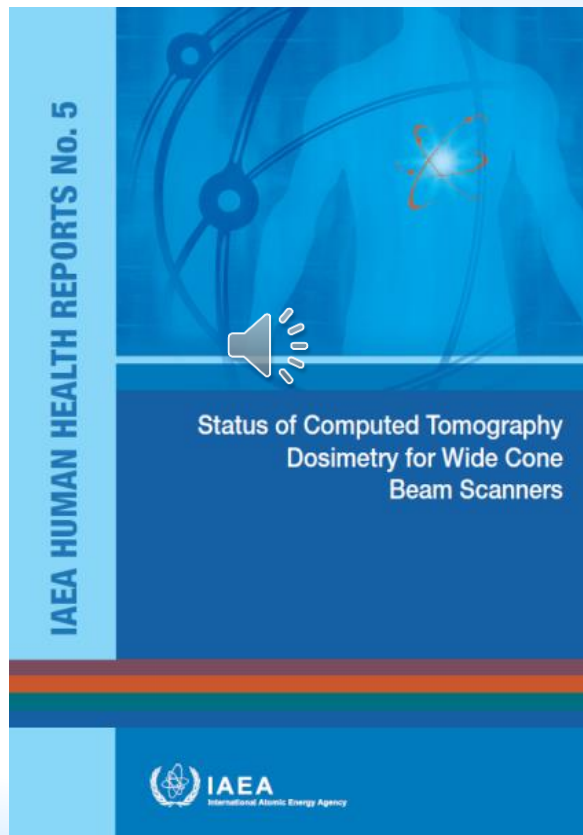
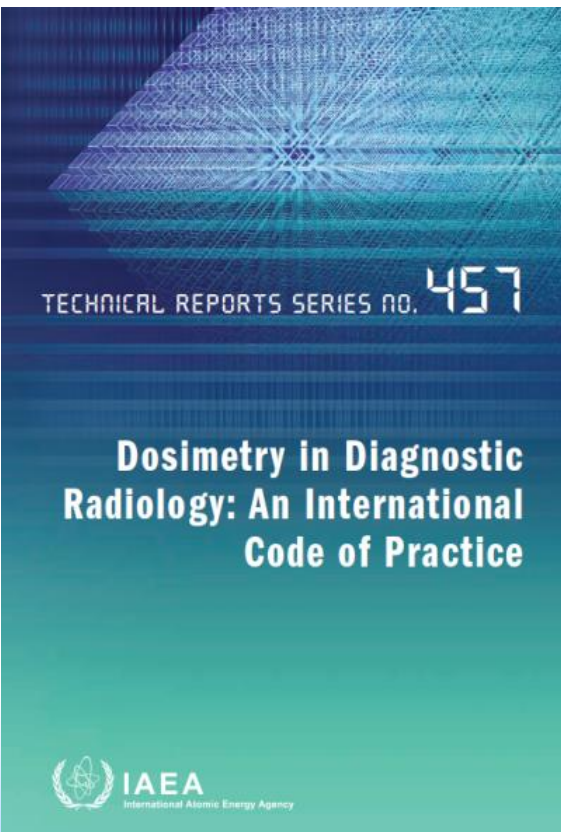
Development of guidelines (education, clinical training and staffing requirements)



Development of guidelines (QA)



Development of guidelines (dosimetry)



Development of guidelines (safety)



Safety Reports Series
No. 61

**Radiation Protection
in Newer Medical
Imaging Techniques:
CT Colonography**

Jointly sponsored by the IAEA, WHO, ISR



With contributions from the

ICRP



Safety Reports Series
No. 60

**Radiation Protection
in Newer Medical
Imaging Techniques:
Cardiac CT**

Jointly sponsored by the IAEA, WHO, ISR



With contributions from the

ICRP

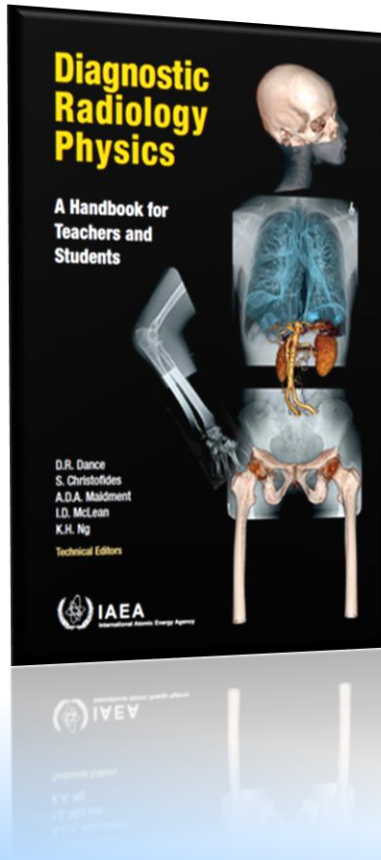


Safety Reports Series
No. 59

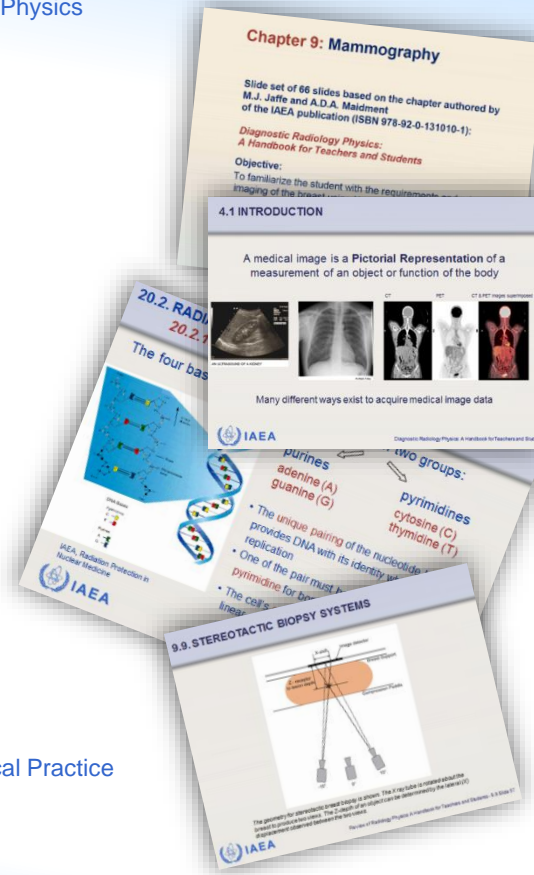
**Establishing Guidance
Levels in X Ray Guided
Medical Interventional
Procedures:
A Pilot Study**



Training – Handbooks and slides



- Fundamentals of Atomic and Nuclear Physics
- Interactions of Radiation with Matter
- Fundamentals of Dosimetry
- Measures of Image Quality
- X ray Production
- Projection Radiography
- Receptors for Projection Radiography
- Fluoroscopic Imaging Systems
- Mammography
- Special Topics in Radiography
- Computed Tomography
- Physics of Ultrasound
- Ultrasound Imaging
- Physics of Magnetic Resonance
- Magnetic Resonance Imaging
- Digital Imaging
- Image Post Processing and Analysis
- Image Perception and Assessment
- Quality Management
- Radiation Biology
- Instrumentation for Dosimetry
- Patient Dosimetry
- Justification and Optimisation in Clinical Practice
- Radiation Protection



Comprehensive clinical audits



IAEA HUMAN HEALTH SERIES

No. 4

Comprehensive Clinical Audits
of Diagnostic Radiology
Practices: A Tool for Quality
Improvement

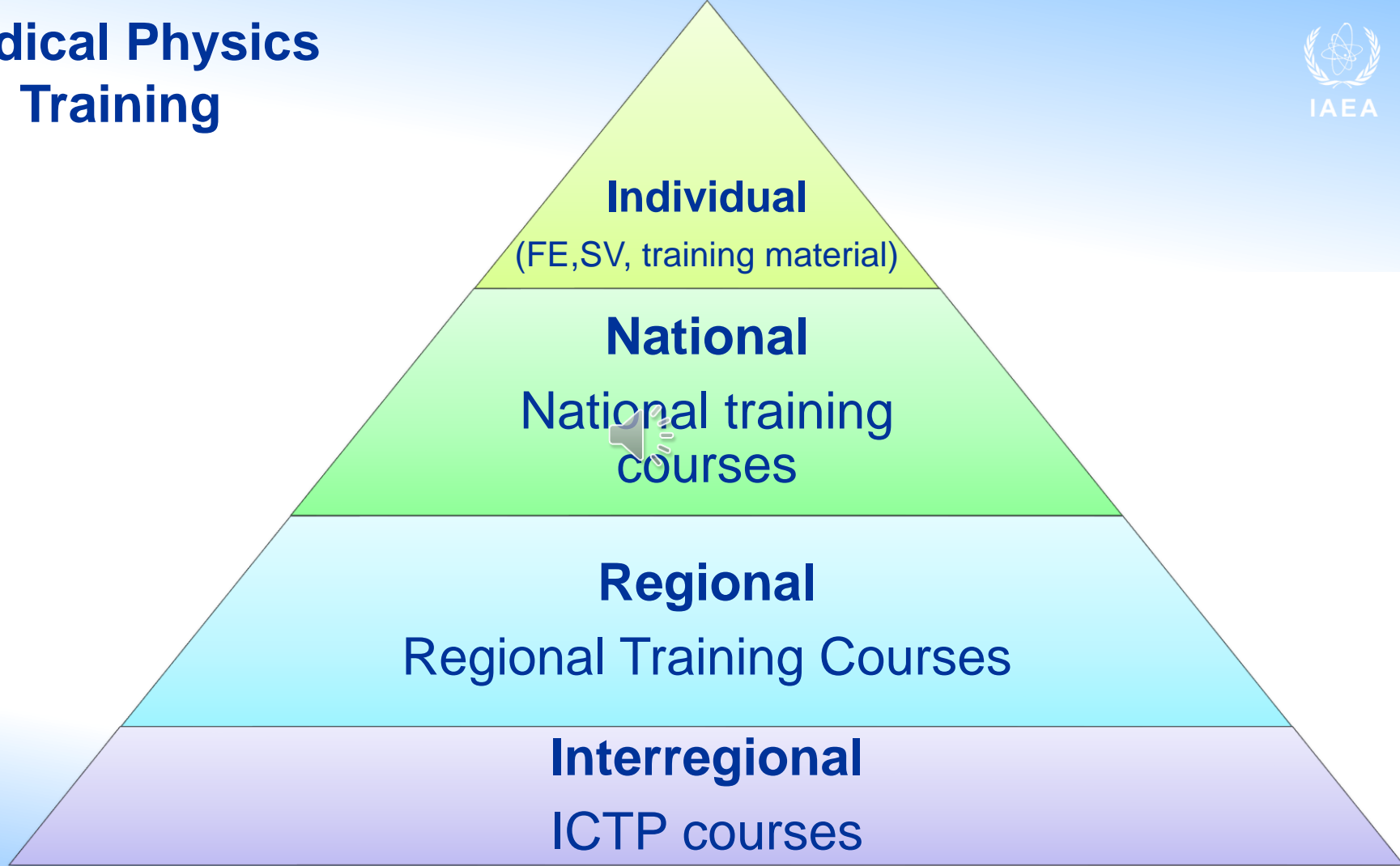
Quality Assurance Audit for Diagnostic Radiology
Improvement and Learning (QUAADRIL)

Clinical audit is one of the key elements within the framework of quality assurance through the comprehensive and critical review of the practice in a medical radiation facility.



- Development of guidance
- Training of auditors
- Development of training material
- Function as the independent auditing body.

Medical Physics Training



Individual

(FE,SV, training material)

National

National training
courses

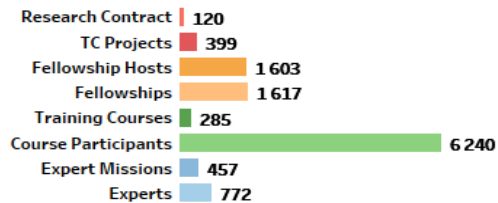
Regional

Regional Training Courses

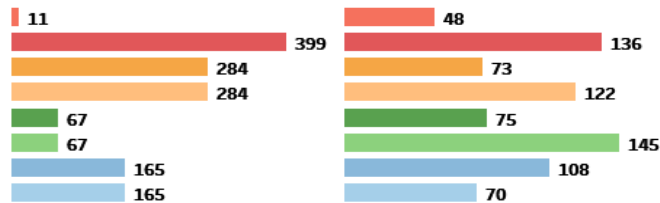
Interregional

ICTP courses

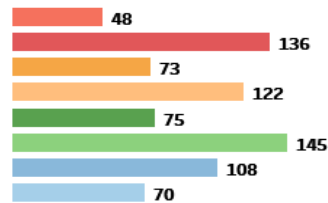
163 Countries 435 Projects 120 Research Contracts 1 619 Fellows 285 Training Courses 6 240 Course Participants 458 Expert Missions 772 Experts



Events



Projects

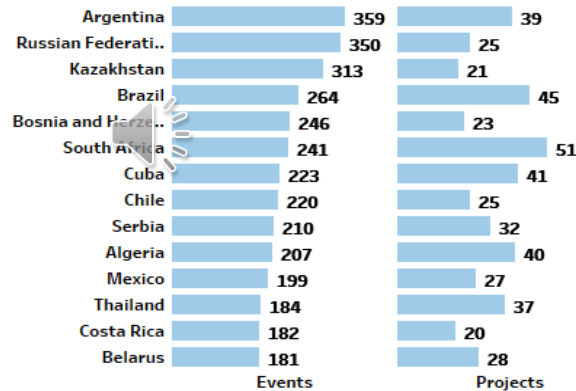


Countries



Country

Activities per country



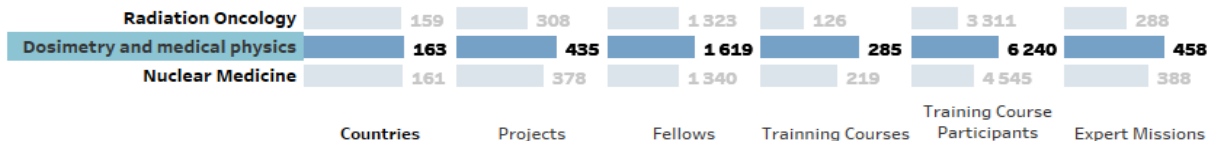
Events

Projects

Country

Search

Institution



Countries

Projects

Fellows

Training Courses

Training Course

Participants

Expert Missions

- EventTopic
- (All)
 - Course Participa...
 - Expert Missions
 - Experts
 - Fellowship Hosts
 - Fellowships
 - Research Contract
 - TC Projects
 - Training Courses

Project Start Year

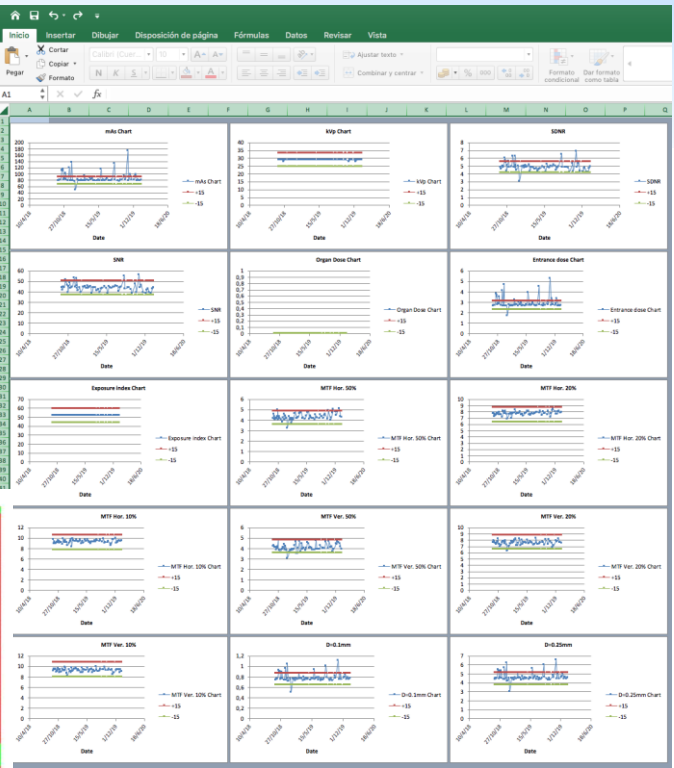
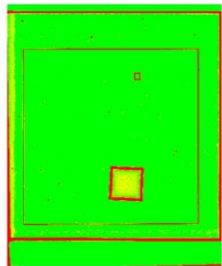
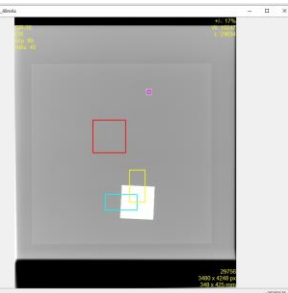
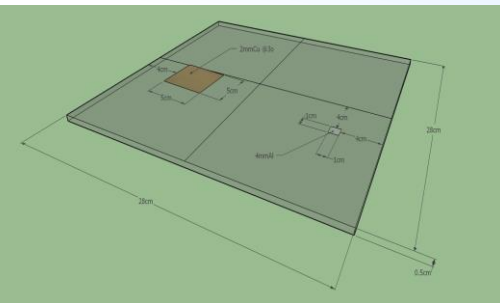
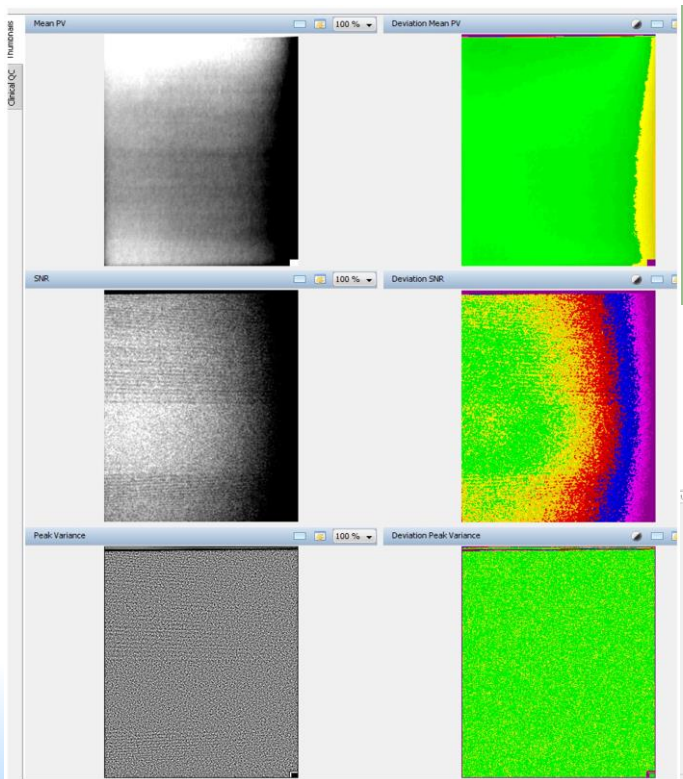
Year of SubStartDate

- SectionName
- (All)
 - Division of Huma...
 - Dosimetry and m...
 - Nuclear Medicine
 - Nutrition
 - Radiation Oncolo...

- Status
- (All)
 - Active
 - Closed
 - Completed
 - New
 - Planned

- Topics
- Research Contract
 - TC Projects
 - Fellowship Hosts
 - Fellowships
 - Training Courses
 - Course Participan...
 - Expert Missions
 - Experts

IAEA Remote and Automated Quality Control for Diagnostic and Mammographic Facilities (guideline)



Expert Group: H. Bosmans (Belgium), P. Mora (Costa Rica) and D. Pfeiffer and M. Arreola (United States of America). The automated tool for image analysis has been developed by G. Zhang (Belgium)



News – Dosimetry and Medical Radiation Physics Section

Year

-Year ▾

Type

-Any ▾

Topics

-Any ▾

Search

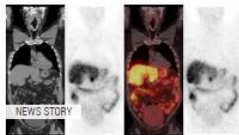
Search



NEWS STORY

17 April 2020

[Safely Embracing the Growing Power of Radiotherapy](#)



NEWS STORY

30 March 2020

[New Atlas to Assist Practitioners of SPECT/CT with Quality Control Procedures and Troubleshooting](#)



NEWS STORY

26 March 2020

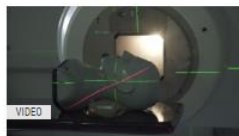
[Research Results Demonstrate how Lower Radiation Doses Can Be Achieved in Diagnostic Imaging of Pediatric Patients \(E24020\)](#)



NEWS STORY

3 January 2020

[How an IAEA Doctoral Coordinated Research Project Empowers Medical Physicists in Advanced Radiotherapy Techniques](#)



VIDEO

8 July 2019

[What is a Linac?](#)



NEWS STORY

26 June 2019

[Supporting the International Dosimetry Chain: IAEA Symposium on Medical Radiation Dosimetry Concludes](#)



NEWS STORY

12 June 2019

[Keeping Radiotherapy Safe and Effective: Q&A with Leading Dosimetry Expert](#)



VIDEO

6 June 2019

[Dosimetry Laboratory Adds Linear Accelerator Capability](#)



NEWS STORY

6 June 2019

[New IAEA Linear Accelerator Facility to Provide Dosimetry Support to Countries Worldwide](#)



VIDEO

19 February 2019

[IAEA Radiation Monitoring Laboratory](#)



NEWS STORY

15 January 2019

[New CRP: Doctoral CRP on Advances in Radiotherapy Techniques \(E24022\)](#)



PRESS RELEASE

21 December 2018

[IAEA Holds Milestone Training on Managing Radiation Dosimetry Laboratories](#)

Research Results Demonstrate how Lower Radiation Doses Can Be Achieved in Diagnostic Imaging of Paediatric Patients (E24020)

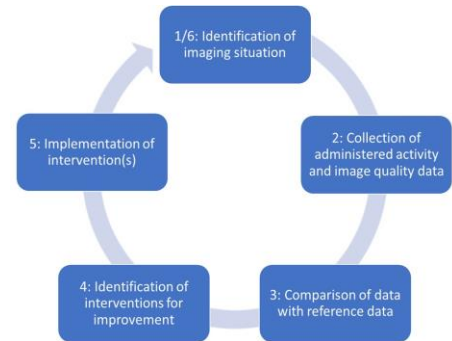
Research Objective

To enhance the capabilities of IAEA Member States to improve the efficiency of existing modalities for paediatric medical imaging, and to optimize the radiation dose administered to paediatric patients, while maintaining the image quality needed to make a clear diagnosis.



Include all relevant staff <ul style="list-style-type: none">• Involve medical physicist, radiographer and radiologist.• Seek external expertise and advice if unsure
Ensure accuracy and calibration <ul style="list-style-type: none">• Check accuracy and tolerance of displayed dose parameters
Be careful with the data recording and archiving <ul style="list-style-type: none">• Initially keep exactly as displayed or downloaded
Ensure data transfer accuracy <ul style="list-style-type: none">• Check at each stage of automated data transfer
Double check manual transcription of data <ul style="list-style-type: none">• Get independently checked
Confirm unit conversion/calibration coefficients <ul style="list-style-type: none">• Get independently checked
Be careful with the comparison of data <ul style="list-style-type: none">• Consider uncertainties when comparing data
Evaluate the applicability of the interventions <ul style="list-style-type: none">• Ensure clinical acceptability via phantom tests
Facilitate proper implementation <ul style="list-style-type: none">• Make sure interventions identified are actually implemented• Introduce changes gradually• Provide training to clinical staff
Share the results <ul style="list-style-type: none">• Share with all staff involved

3 MP MSc theses, 12 abstracts and 24 papers



Conclusions

- DMRP activities are focused on all aspects of radiation in medicine to ensure safety and quality.
- A lot of effort and financial resources are given by the IAEA to Member States to advance and ensure safe use of radiation medicine.
- The development of MS encourage us to strengthen our efforts in the medical physics era.



THANK YOU FOR YOUR ATTENTION



**Also a big thank you to all the
experts that have devoted their time
and efforts to help us in achieving
these goals**