

Working Group Topics

WG 1&2 – What are the challenges for the optimisation of patients and workers in interventional radiology?

What are the ALARA tools available? Usages and suitability

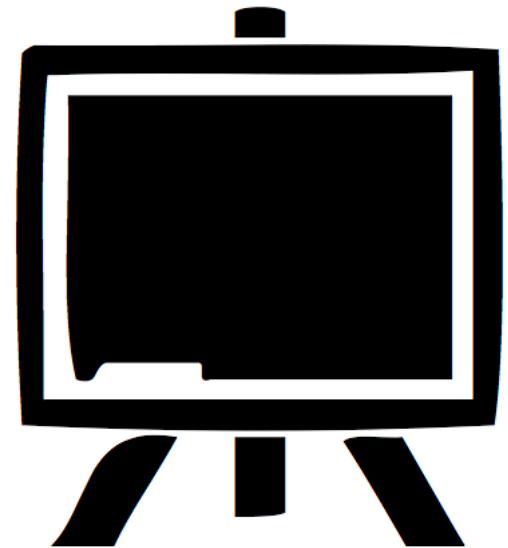
WG 3 – What are the elements of a good ALARA culture in (nuclear) medicine?

WG 4 – Technical developments in nuclear medicine: how to instil RP from the outset?

Report back

Feedback from the working groups

+ discussions



20th EAN Workshop

Conclusions & Recommendations

“ALARA for interventional radiology & nuclear medicine”

AGES, Vienna

02-04 October 2023

Sylvain Andresz, CEPN, EAN Co-ordinator

Julie Morgan, UK Health Security Agency, EAN Secretary

Objectives

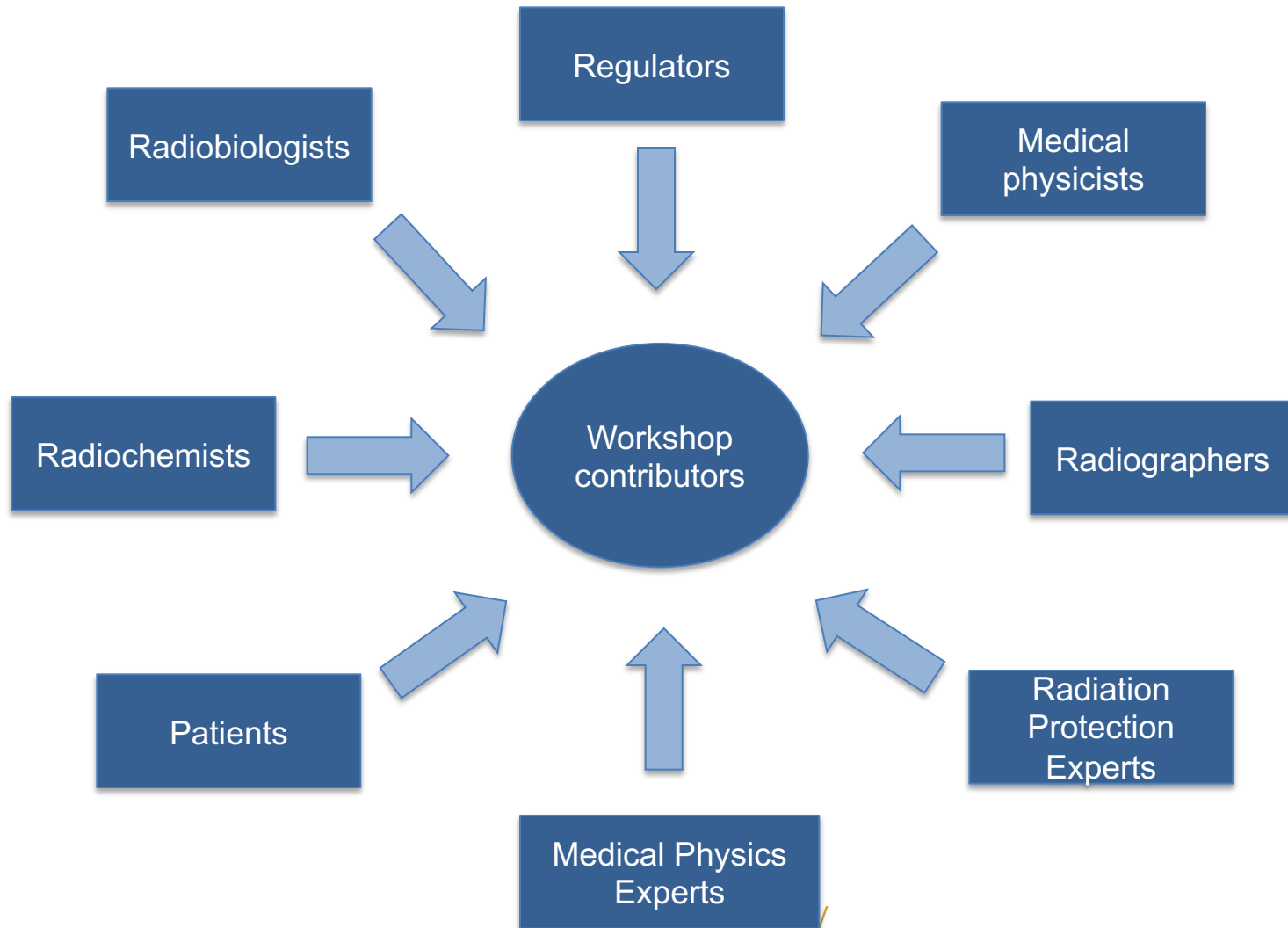
- Re-visiting some topics from the 13th EAN workshop
- **Objectives:**
 - To examine the challenges faced when applying the ALARA principle in interventional radiology and nuclear medicine (new radiopharmaceuticals)
 - To consider how the ALARA principle can be better implemented for
 - Patient and staff exposures
 - Diagnostic and therapeutic uses

Objectives

To bring together relevant stakeholders to:

- discuss emerging issues and discuss progress with existing ones
- exchange practical ideas and experience
- identify issues for further investigation and research to improve ALARA in IR and NM
- Provide conclusions and recommendations

Stakeholders contributions



Stakeholders

- 40 participants, 10 countries
- Representation sufficient?
- Who is missing....?
 - Manufacturers
 - Clinicians/doctors/nurses

Summary of session presentations

Session 1 : setting the scene

- Significant increase in number, type and complexity of interventional procedures
- Development and use of new radionuclides for diagnostic and therapeutic procedures
- Optimisation of exposure to:
 - Patient - radiation injuries possible (up to 200 mSv/procedure and potential for multiple procedures)
 - Staff – classification, potential to breach eye dose and whole body limits $>20\text{mSv/year}$
 - Comforters and carers – dose constraints
 - Public – dose constraints
 - Environment

Session 1: continued

- Responsibility of RPE / MPE
- Availability and visibility of MPEs
- Harmonisation of protocols and practice across Europe
- Guidelines for manufacturers of equipment
- Appropriate selection of equipment
- Quality assurance
- Evaluation of dose / administered activity

Session 1: continued

- Incidents:
 - Contamination incidents resulting in high skin doses (~2 Sv)
 - Tissue injuries in interventional radiology (patients and physicians)
 - Failure to follow procedures, lack of supervision
 - Safety in Radiological Procedures (SAFRAD) system – voluntary reporting of adverse events
 - Trigger dose indicators
 - 319 events logged

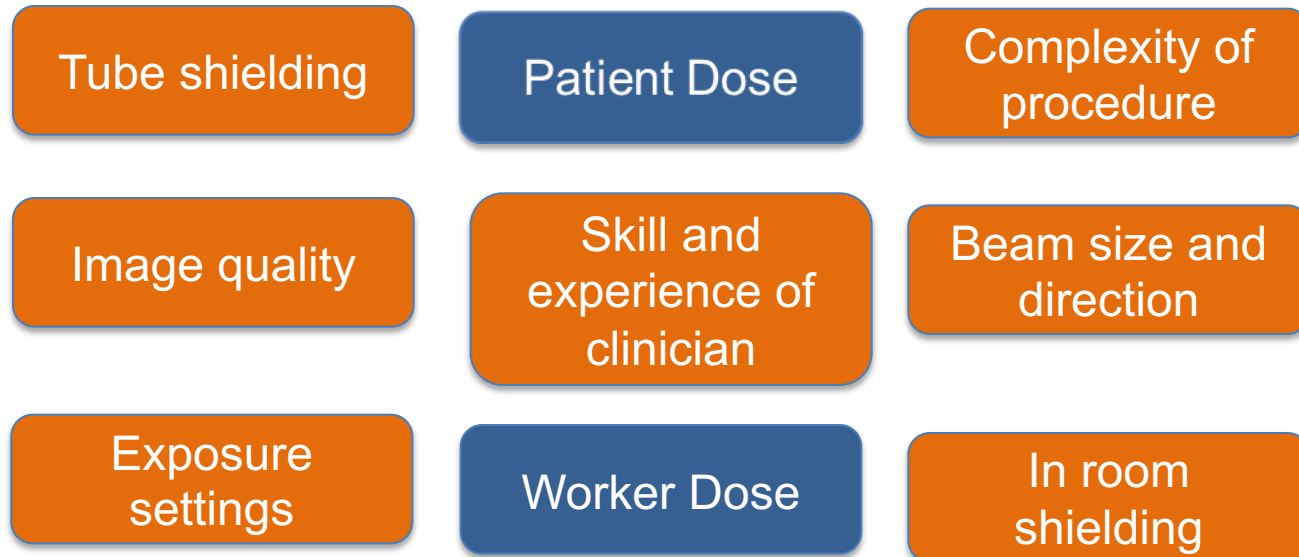
Session 2 : Tools for ALARA

- Dosimetry (dose to body, eye, brain, extremities)
... with potential changes with new dose quantities
- Active vs passive
- Computational “dosimeter-free” dosimetry – the role of modelling
- Feedback of doses to drive optimisation
- Time, distance, shielding can be utilized
- RP measures for IR are well known (positioning, access, shielding, collimation, beam ‘on’ time)
- Shielding – room based (shields, screens, drapes)

Session 2 : Tools for ALARA

- Shielding – person (PPE) – fit and comfort is key, personalized PPE
- Image processing (ability to see more with less dose)
- Optimizing and individualizing therapeutic NM procedures
 - Need to know activity delivered (supplier issues)
 - Treatment planning
 - Sv vs Bq
 - Solid quality assurance framework

Factors affecting patient and worker doses (IR)



Session 3: Focus on new radiopharmaceuticals

- Many new radionuclides under investigation, including theragnostic pairs (Terbium/Yttrium/Copper)
- Internal vs external exposure / risk
 - alpha vs beta emitters vs gamma emitters
 - RP considerations for each stage from production to administration (ideally)
- Working practices
 - assessment of risk and dose (routine and accidental)
 - make decisions around how to manage work from RP perspective e.g. designation of areas and workers,
 - the special case of ^{223}Ra

Session 3: Focus on new radiopharmaceuticals

- Dosimetry : extremity doses in NM
 - use of correction factors to convert finger ring (6x) and wrist doses (20x) to fingertip doses
 - practical measures to reduce finger dose
 - need to consider dose from skin contamination
- Manufacturing considerations:
 - half-life, volatility, decay profile, ...
 - impurities (chemical and radioactive)
 - chelator

Session 4: Education and training, culture

- Harmonization of training and recognition of RPEs and RPOs across member states
- Training of MPEs
- Content and delivery of suitable training (and receptivity)
- Examples of good practice from EUTEMPE
- Radiation protection culture “What people do when no-one is looking”
- IRPA Guiding Principle on RP Culture
- Key features of a good culture are E&T and effective communication

Key themes and topics

- Optimisation of staff dose and patient dose are interlinked
- ALARA is a continual process:
 - suitable risk assessment and dose estimates, control measures, systems of work
 - supervision, monitoring of arrangements (DRLs), dose assessments, incident/near miss investigations
- Communication and dissemination of information, training and dose results to promote ALARA culture

- Role and responsibilities of the RPE and MPE
 - Degree of involvement in IR and NM practices
 - Training of practitioners and ongoing audit/support
 - More resources needed (money + staff)
- Importance of regulation
 - EU BSS Directive
 - National regulation
 - Inspection (and prosecution)

- Education and training (professionals)
 - Guidance and protocols: the better the E&T, the lower the dose (learning curve)
 - Networks (HERCA, IRPA, EFOMP-EUTEMPE, EUTERP)
 - Resources for new radiopharmaceuticals
 - Attitudes vary by generation
 - essential for cultivating a radiation safety culture
 - Explaining the impact of new ICRU report: a challenge in E&T
- Patient information
 - Informed consent, restrictions
- Deceased patients
 - autopsy, cremation, scattering of ashes

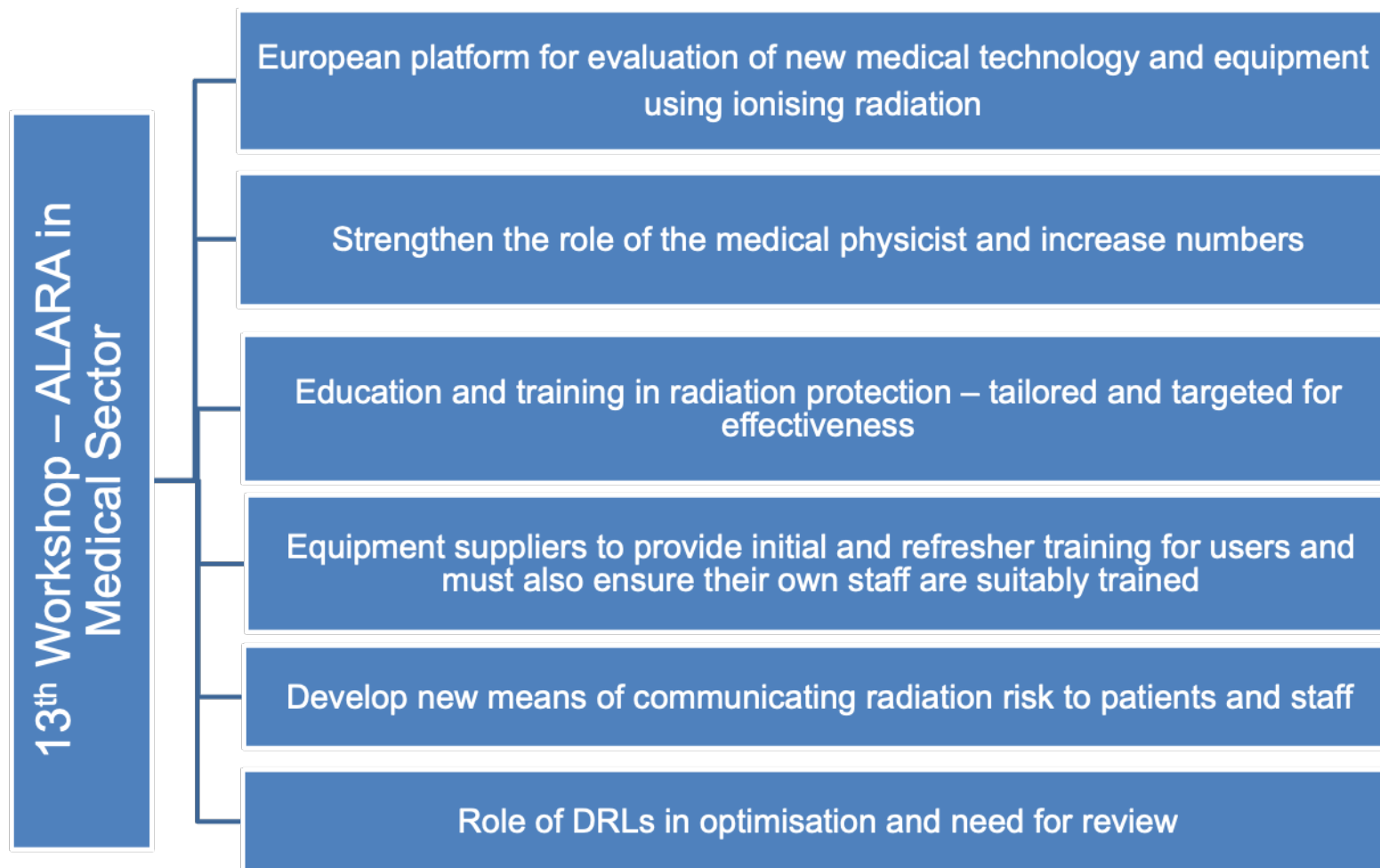
- Incidents
 - reporting and sharing of lessons learned
 - further education and training
 - review of procedures/processes
 - Implement additional controls
 - databases to enable sharing across Europe
 - importance of hearing the “bad news”
 - culture of candour
 - rehearsals of contingency plans

- Manufacturers (all)
 - Rapid pace of technology developments
 - Provision of information and training to end users
 - ALARA by design (hardware and software)
 - Quality assurance tools/objects/data collection
 - Supply of activity
 - Supplier instructions regarding risk (HERCA template)

- Cutting edge developments that could impact ALARA:
 - Computational dosimetry
 - Simulations and modelling
 - Dose-response modelling for new (and existing) radiopharmaceuticals
 - Possible reduction of administered dose when combined with chemotherapeutic drugs (same tumour response for lower activity)
 - Total body PET

What are the recommendations?

Previous Workshop recommendations



20th Workshop – recommendations

- WG 1 & 2: X recommendations
- WG 3: 3 recommendations
- WG 4: 7 recommendations

- X recommendations in total!

The way forward

- Synthesis of conclusions and recommendations will be formulated based on the feedback from the presentations, WG's and discussions and dialogues.
- Published on the EAN website and in the newsletter
- Synthesis to be published in Journal of Radiological Protection (JoRP)
- Report back to ICRP as Special Liaison Organization

Thanks to the Programme Committee

Mrs. Penelope Allisy-Roberts	European Federation of Organisations for Medical Physics
Mr. Sylvain Andresz	Nuclear Protection Evaluation Centre (CEPN), France
Mr. Sotirios Economides	Greek Atomic Energy Committee (EEAE), Greece
Mr. Franz Kabrt	Austrian Agency for Health and Food Safety, Austria
Mrs. Julie Morgan	UK Health Security Agency (UKHSA), United Kingdom
Mrs. Sharan Packer	Society for Radiological Protection (SRP), United Kingdom
Mr. Arturo Perez Mulas	Spanish Nuclear Safety Council (CSN), Spain
Mr. Andy Rogers	Nottingham University Hospitals NHS Trust, United Kingdom
Mrs. Caroline Schieber	Nuclear Protection Evaluation Centre (CEPN), France
Mr. Nicolas Stritt,	Swiss Federal Office of Public Health (FOPH), Switzerland
Mr. Fernand Vermeersch	SCK CEN, Belgium

Coming soon...

EAN 21st (mini) Workshop “ALARA for NORM exposures”

in collaboration with European NORM Association (ENA)

Planned for May 2024, Rome

Thanks to AGES

A big **Thank You** to the team at AGES for being wonderful hosts for this EAN Workshop

Philipp Hofer
Franz Kabrt

Thank you for your participation

(.ppt will be on-line (*soon*)
eu-alara.net)