Ethical Dimension of the Radiological Protection System

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Activities involved radiation

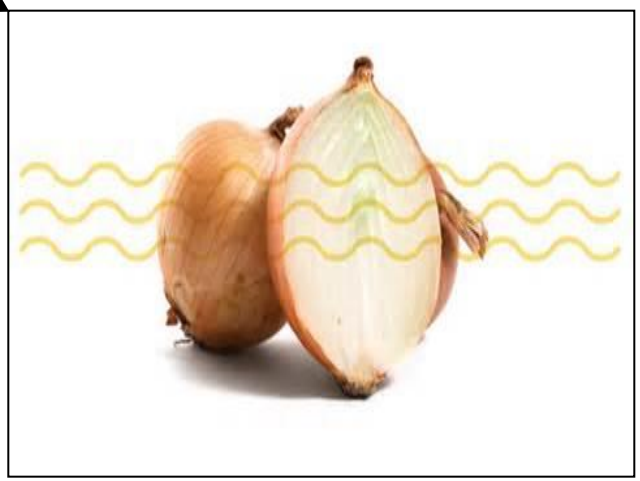
Radiation application

Medical application

Non destructive testing

Power supply

Electricity generation



Food irradiation

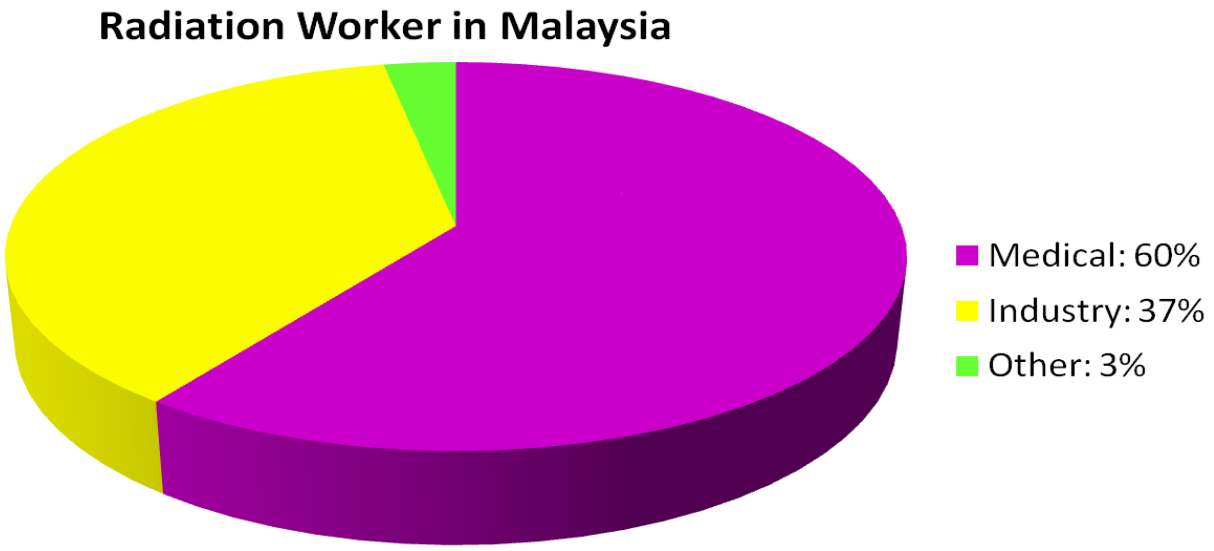
- Radiation protection can no longer be treated as an isolated practice

- The growing applications of ionising radiation in various industries demand a network of practitioners with strong sense of responsibility for radiation safety

- In strengthening radiation protection culture, involved:
  - ➢ different groups and
  - ➢ specialised services in related field

Radiation Protection in Workplace

- About 24000 radiation workers in Malaysia
- In various application such as medical, industry, research institute , education and others



International Commission on Radiological Protection (ICRP)

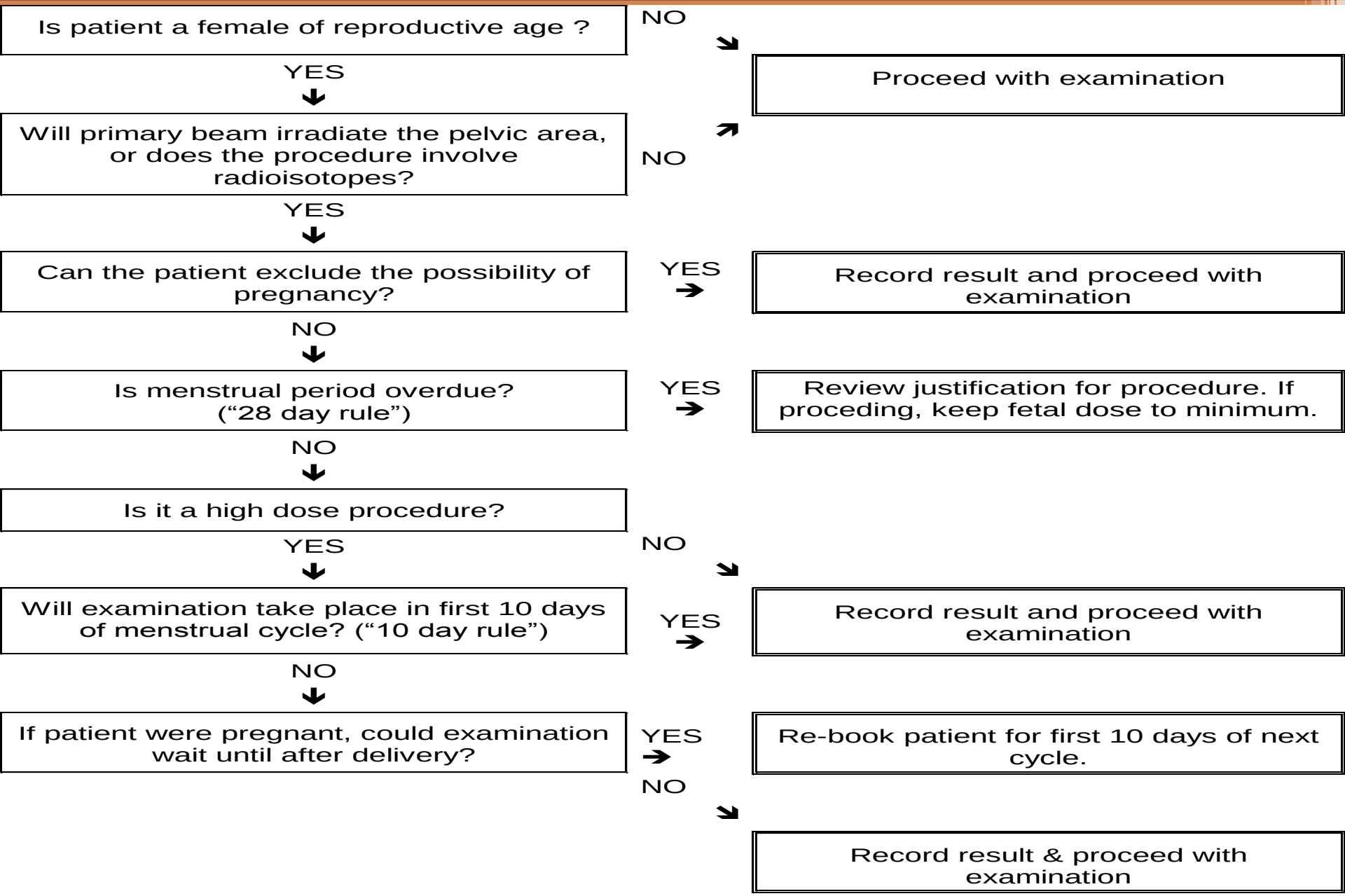
Principles of Radiological Protection

- The Justification of practices
- The Optimisation of Protection (ALARA)
- Individual Dose and Risk Limits

The Optimisation of Protection

- *In relation to any particular source within a practice :*
  - *the **magnitude of individual doses**,*
  - *the **number of people** exposed,*
  - *the **likelihood** of incurring exposures where these are not certain to be received*

  *Should be kept **as low as reasonably achievable**, **economic and social factors being taken into account**.*
- *This procedure should be related to*
  - *the dose to individuals (**dose constraints**),*
  - *the risks to individuals in the case of potential exposures (risk constraints)*


Is patient a female of reproductive age ?
NO
Proceed with examination
YES
Will primary beam irradiate the pelvic area, or does the procedure involve radioisotopes?
NO
YES
Can the patient exclude the possibility of pregnancy?
YES
Record result and proceed with examination
NO
Is menstrual period overdue? (“28 day rule”)
YES
Review justification for procedure. If proceding, keep fetal dose to minimum.
NO
Is it a high dose procedure?
NO
YES
Will examination take place in first 10 days of menstrual cycle? (“10 day rule”)
YES
Record result and proceed with examination
NO
If patient were pregnant, could examination wait until after delivery?
YES
Re-book patient for first 10 days of next cycle.
NO
Record result & proceed with examination

Individual Dose and Risk Limits

- The exposure of individuals resulting from the combination of all the relevant practices should be subject :
  - *to dose limits,*
  - *to some control of risk in the case of potential exposure.*

- Not all sources are susceptible of control by action at the source and it is necessary to specify the sources to be included as relevant before selecting a dose limit.

- Prevent deterministic effects & Limit risk of stochastic effects to acceptable level.

APPLICATION	DOSE LIMIT (1)
	Occupational
Effective dose	20 mSv per year averaged over defined periods of 5 years (2)
Effective dose to the embryo or foetus	1 mSv
Annual equivalent dose in: the lens of the eye the skin (4) the hands and feet	150 mSv 500 mSv 500 mSv

1. The limits apply to the sum of the relevant doses from external exposure in the specified period and the 50-year committed dose (to age 70 years for children) from intakes of radioactive nuclides in the same period.
2. With the further provision that the effective dose should not exceed 50 mSv in any single year.
3. In special circumstances, a higher value dose could be allowed in a single year, provided that the average over 5 years does not exceed 1 mSv in any single year.
4. The limitation on the effective dose provides sufficient protection for the skin against stochastic effects. An additional limit is needed for localised exposures to prevent deterministic effects.

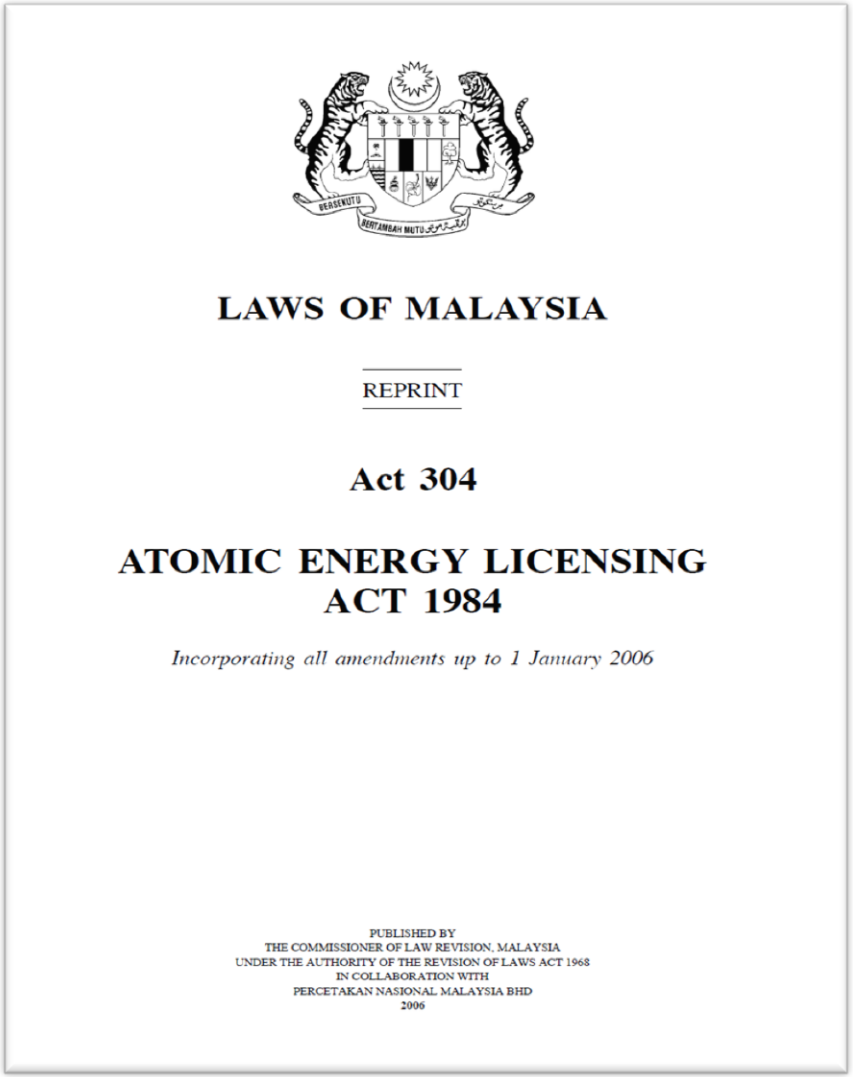
ICRP's Three Types of Exposure

- Occupational
- Medical
- Public

Occupational exposure definition

All exposures of workers incurred in the course of their work, with the exception of exposures excluded from the Standards (BSS) and exposures from practices or sources exempted by the Standards

Regulations Stipulated Under ACT 304



LAWS OF MALAYSIA

REPRINT

Act 304

ATOMIC ENERGY LICENSING ACT 1984

Incorporating all amendments up to 1 January 2006

PUBLISHED BY
THE COMMISSIONER OF LAW REVISION, MALAYSIA
UNDER THE AUTHORITY OF THE REVISION OF LAWS ACT 1968
IN COLLABORATION WITH
PERCETAKAN NASIONAL MALAYSIA BHD
2006

- P.U. (A)149 Radiation Protection (Licensing) Regulations 1986
- P.U. (A) 206 Atomic Energy Licensing (Appeal) Regulations 1990 (English & Malay)
- P.U. (A) 456 Radiation Protection (Transport) Regulations 1989
- P.U. (A) 145 Radiation Protection (Transport)(Amendment) Regulations 1991(English & Malay)
- P.U. (A) 46 Atomic Energy Licensing (Basic Safety Radiation Protection) Regulations 2010 (English & Malay)
- P.U.(A) 274 Atomic Energy Licensing (Radioactive Waste Management) Regulations 2011 (English & Malay)

The Basic Safety Standards

- Responsibilities
- Conditions of service
- Classification of areas
- Local rules and supervision
- Personal protective equipment
- Co-operation between employers registrants and licensees
- Individual monitoring and exposure assessment
- Monitoring of the workplace
- Health surveillance
- Records
- Special circumstances

Medical Exposure

- “exposures incurred by individuals as part of their own medical diagnosis and treatment .”
- “and . . . individuals helping in the support and comfort of patients undergoing diagnosis and treatment *(not occupationally) . .* .”

- No dose limits apply
- Consider dose constraints

Public Exposure

- Limits apply to exposures from human activities
- 1 mSv a year effective dose
  - in special circumstances, average over 5 years
- 15 mSv a year to lens of eye
- 50 mSv a year to 1 cm^2 of skin
- (i.e 1/10 of worker limit)

Ethical Dimension

LIAISON AND COOPERATION (ICRP, Code of Practice, Law under Delegation Authority and Local Rules)

- **To understand essential elements and concepts to be addressed in legislation applied in RADIATION SAFETY and RADIATION PROTECTION.**
- **To appreciate the roles and responsibilities of regulatory authorities, licensee (operating agency), manufacturer and other related bodies.**
- **To understand the relationship between licensor – licensee – staffs, regulatory and operating agencies.**

Delegation Of Authority

- Authority is a vehicle for Radiation Protection Officer
  - Covers Radiation Safety Program Actions including
    - Initialization
    - Recommendations
    - Corrections
    - Compliance
    - Add the oversight of Ionizing Radiation Equipment

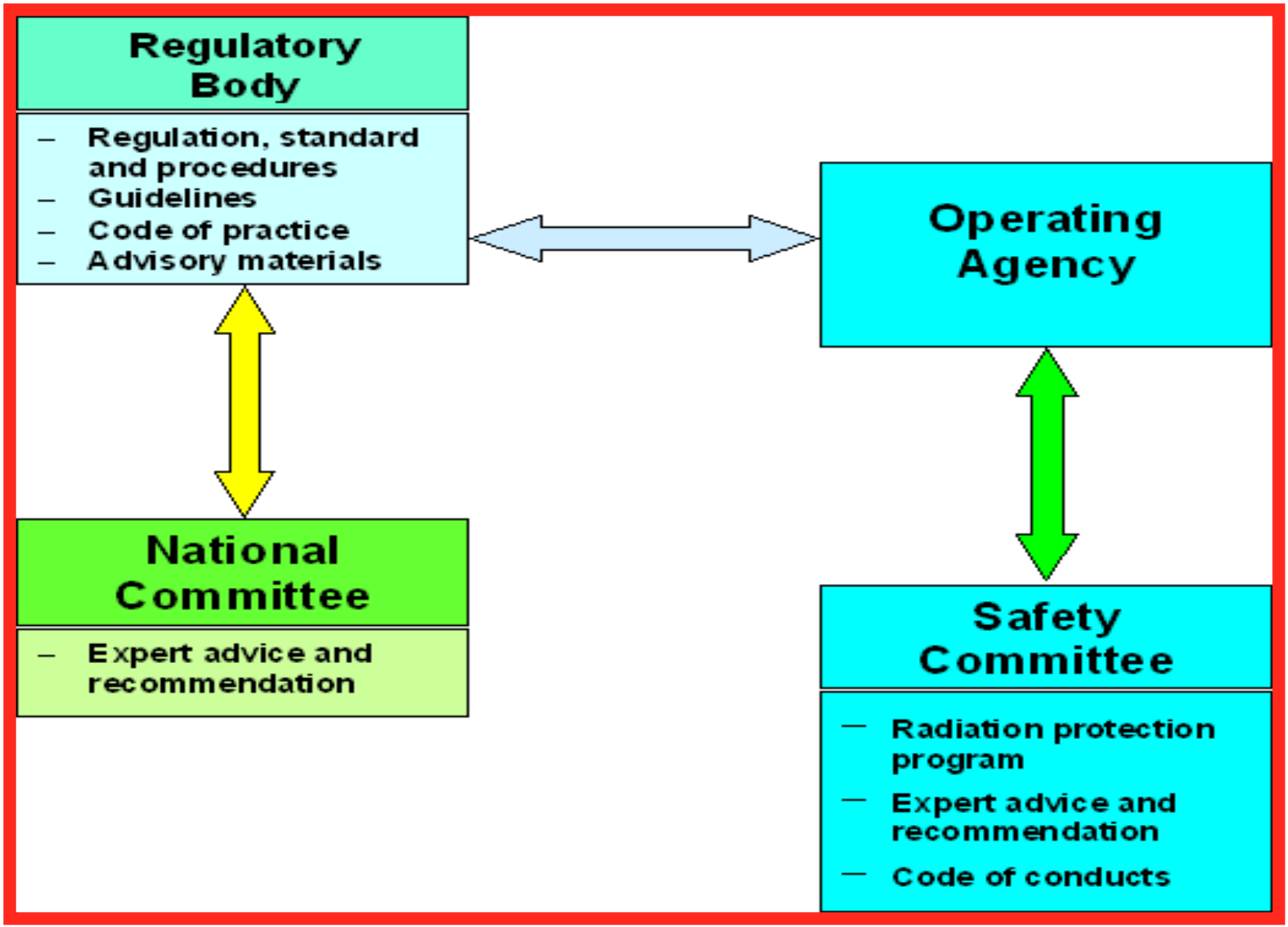
Relationship with Other Organisations

- **Maintain good rapport with licensee and appropriate national organisations**
- **Establish good networking with national and international establishments**
- **Hierarchical communication and dissemination of information**
- **Service delivery system to address the need of stakeholder**
  - **efficient, effective and ethical**
  - **continual improvement**

Radiation Protection Committee

- **Assist the organisation in term of expert advice in addressing issues and problem solving both at national level and agency level**
- **Members comprising the expert and practitioner, can be within or outside organisation, appointed by the government at national level and the licensee at agency level**

Line of Communication



Safety Communication Hierarchy at Agency Level

Radiation Protection Committee

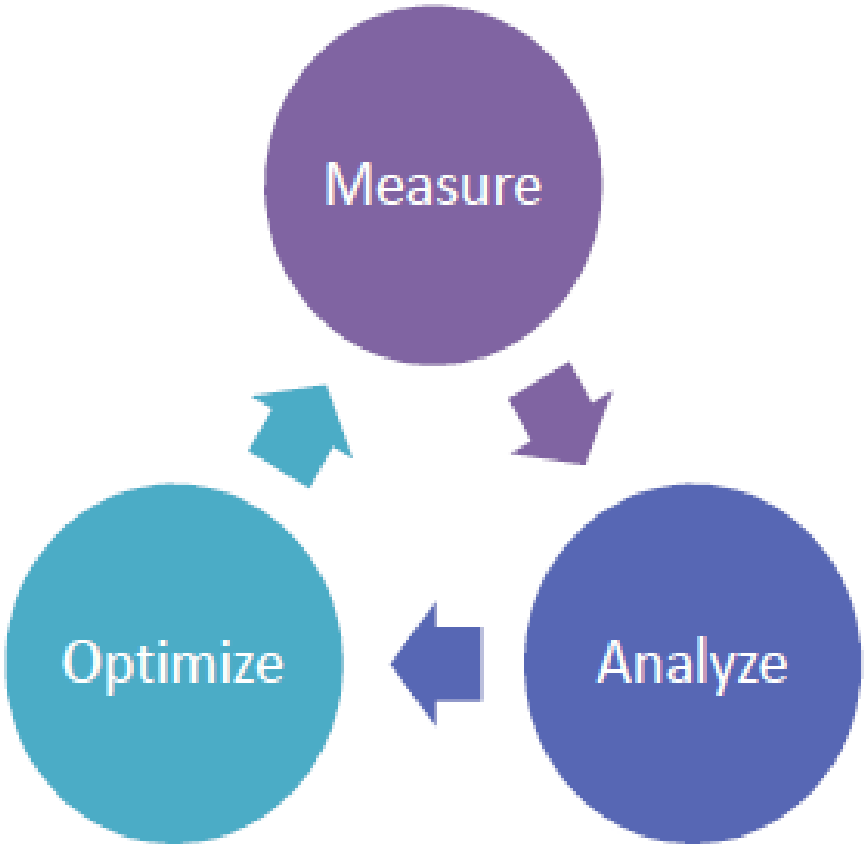
Person Responsible Toward License

RPO

RPS

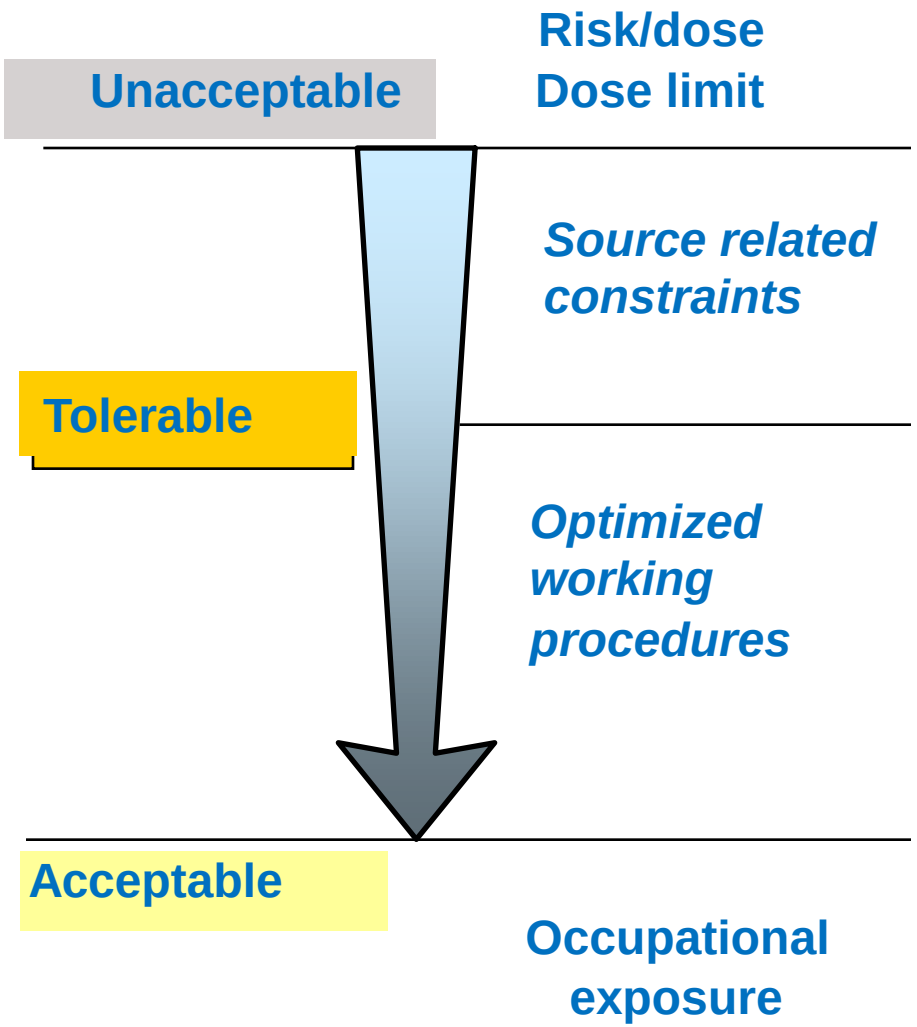
OPERATOR/RAD. WORKERS

Radiation Safety Program

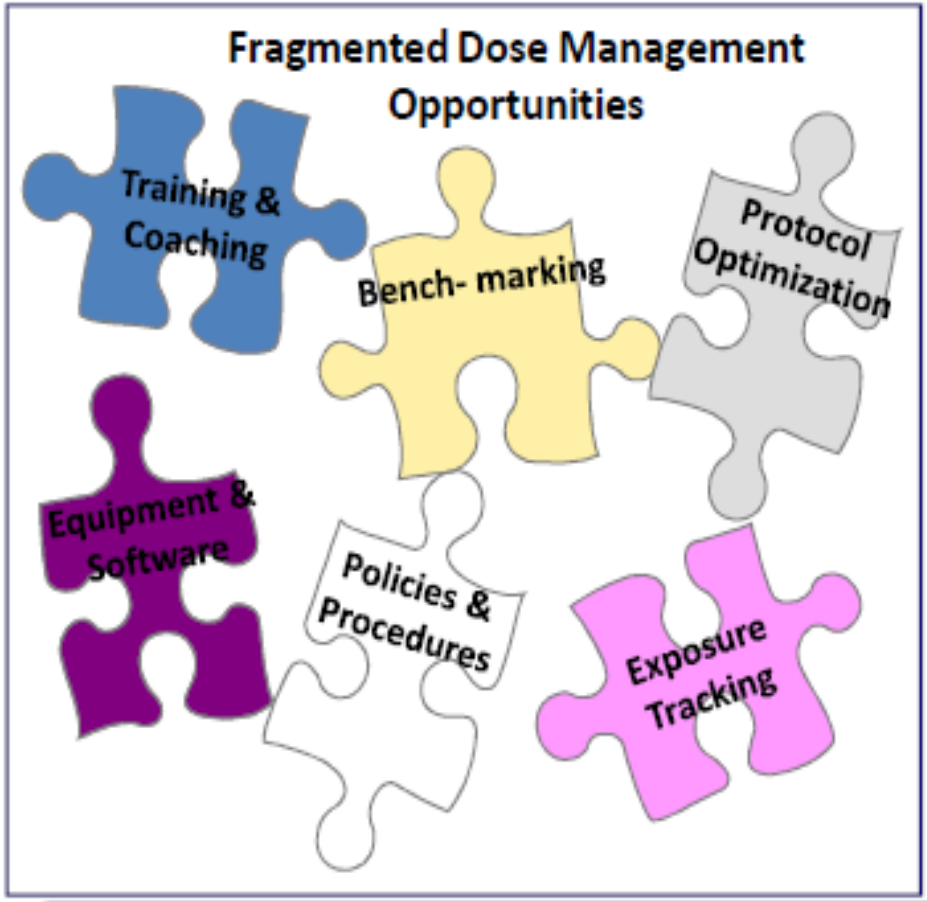


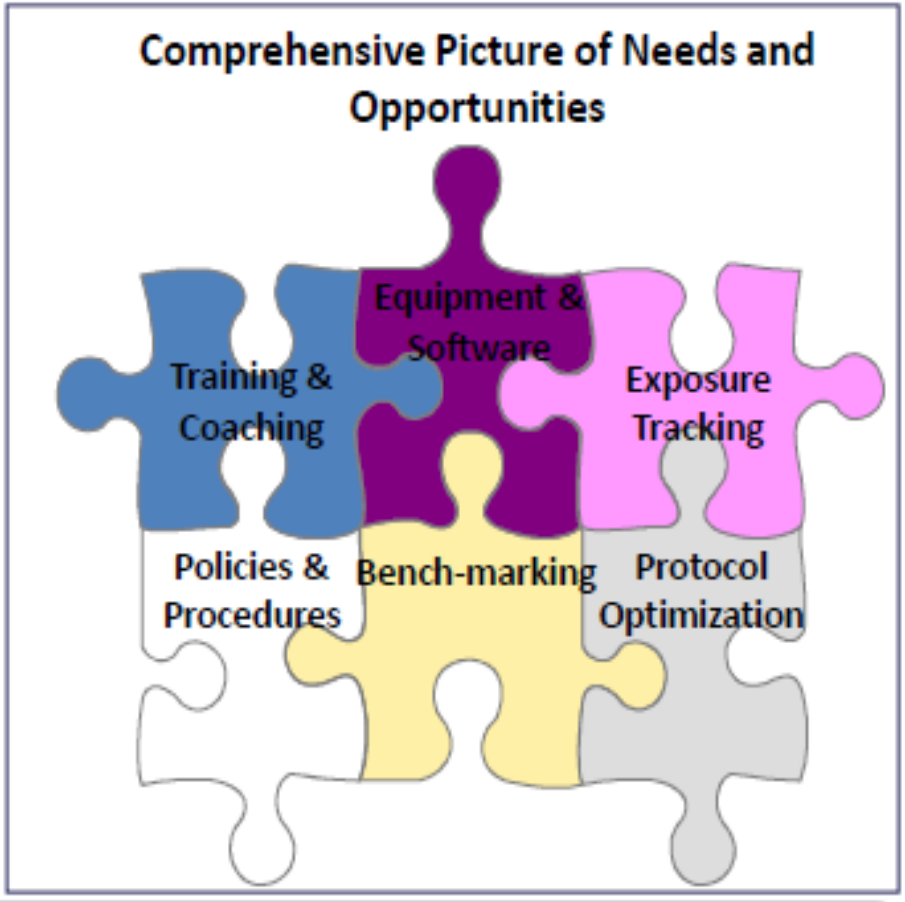
- **Measure** : Tools and processes to systematically track public and occupational radiation exposures
- **Analyze** : Independent assessment to identify highest priority opportunities to optimize radiation dose or minimize occupational exposure at the facility
- **Optimize** : Implement tailored radiation safety “best practices” to address evolving technology , safety and regulatory needs.

Optimization of protection



Opportunities for dose management are numerous, fragmented and can be overwhelming





Responsible Imaging enables clients to transform many fragmented dose management opportunities into a comprehensive picture, and focus on those that are complimentary and address your evolving needs

Evolving Technology, Regulatory And Safety Needs....

TECHNOLOGY	REGULATORY	SAFETY
• Rapid evolution of equipment • Dose reduction features and software • Exposure alerting system • Standard Dose Registry • Independent radiation dose tracking software and measurement solutions	• ACT and regulations stipulated under the ACT • Accreditation requirements • Code of practices • Congressional / Public Hearings	• Radiation safety Manuals • Local Rules • International recommendations • Consumer Reports on hazard and risk

...leaves healthcare leaders wondering

"What Should I Do About Radiation Dose???"

Radiation Safety – One of A Growing National Concern

Training

- Hazard & Risk
- Safety Culture Assessment

Program

- Monitoring
- SOPs / Protocols

Law

- ACT and Regulations
- Accreditation requirements

Suggested Action For Practices Quality Improvement (PQI)

Right Procedure	• Techniques can be used • Education
Right Dose	• Adhere to ALARA and quality of work • Review dosing protocols • Record the dosage or exposure
Effective Processes	• Password – protect prtocols • Involve the RPO in safety at workplace • RPO will be the member of Safety Committee • Proper Training For all staffs
Safe Technology	• Audit equipment for potential risks • Have equipment inspected by qualified person
Safe Culture	• Refer to applicable standard

Chain Established In Radiation Safety

1. Leadership Safety Values and Actions

Leaders demonstrate a commitment to safety in their decisions and behaviors

2. Problem identification and Resolution

Promptly and fully identify, evaluate, and correct safety issues commensurate with significance.

3. Personal Accountability

Take personal responsibility for safety.

4. Works Process

Plan, implement, and control work activities so that safety is maintained.

5. Continuous Learning

Seek out opportunities to learn and implement ways to ensure safety.

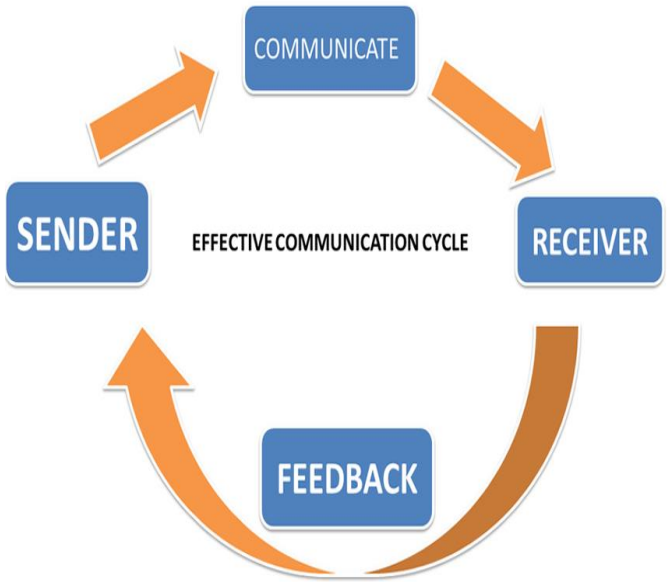
6. Environment for Raising Concerns

Encourage raising safety concerns without fear of retaliation, intimidation, harassment, or discrimination.

Chain Established In Radiation Safety cont.

7. Effective Safety Communications	8. Respectful Works Environment	9. Questioning Attitude
Maintain a focus on safety.	Permeate trust and respect through the organization.	Avoid complacency and continually challenge existing conditions to identify discrepancies that might result in inappropriate action.

Establishing adequate and proper communication By *MARPA*



THE ROLE OF MARPA :

- Encourage activities and information exchange in RP field
- Assist in informing both the public and professionals on the problems and requirement related to radiation protection
- Promote professional training in radiation protection
- Operate with other body or association at national or international level
- Networking : Exchange information and experience
- Promote professional training in radiation protection