

HARMONIZATION OF RADIATION SAFETY

Emerging challenges in the management of medical exposures

Views from PAHO, WHO, EC, IAEA

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Pablo Jiménez

Regional Advisor in Radiological Health

Washington, DC. USA

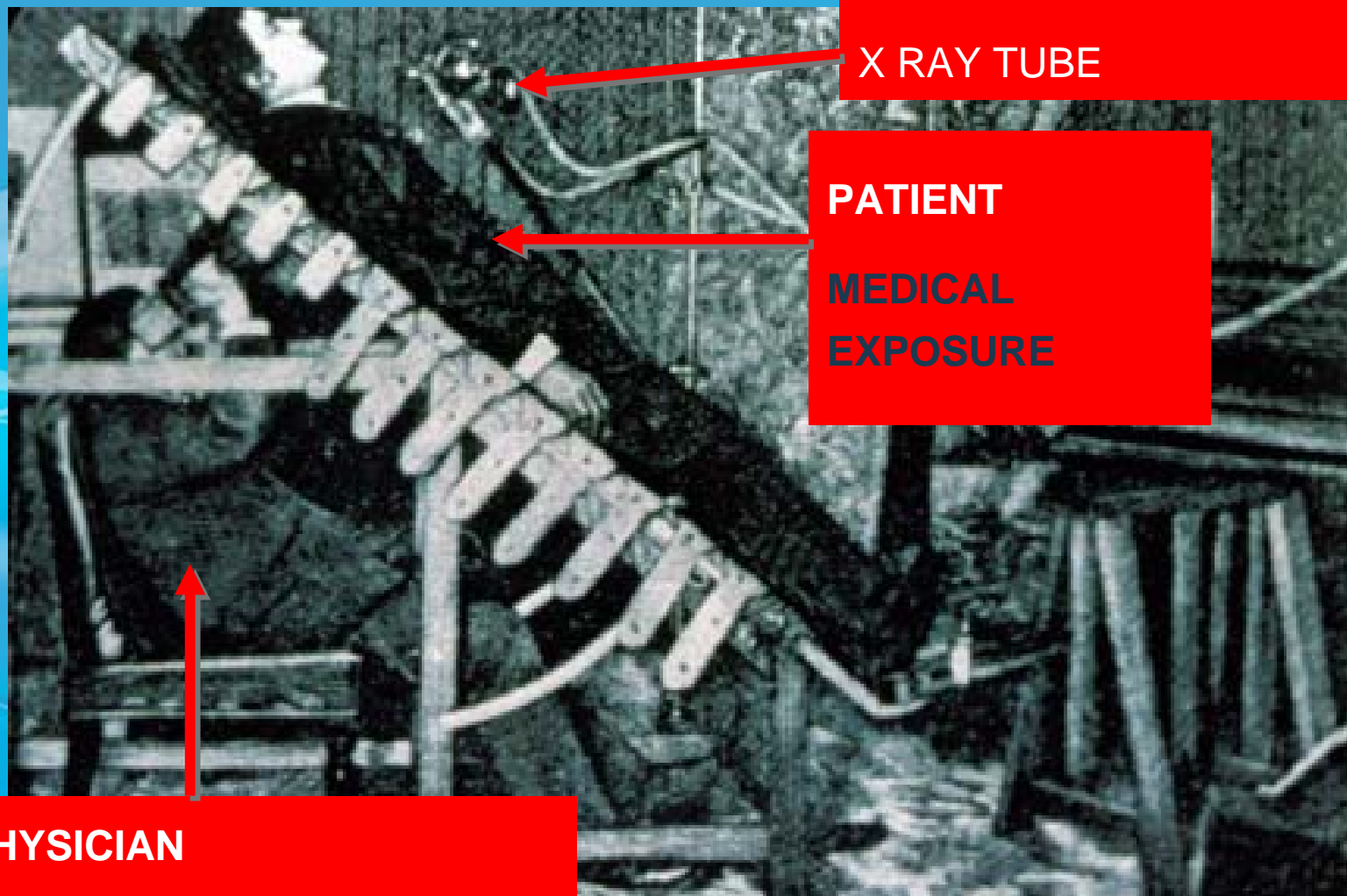
Pan American Health Organization

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WHAT IS MEDICAL EXPOSURE?



X RAY TUBE

PATIENT

MEDICAL
EXPOSURE

PHYSICIAN

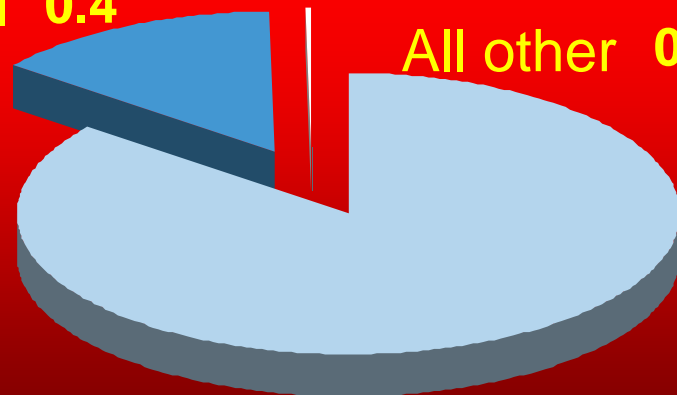
OCCUPATIONAL EXPOSURE

GLOBAL ANNUAL EFFECTIVE PER CAPUT DOSE (mSv). UNSCEAR

2000

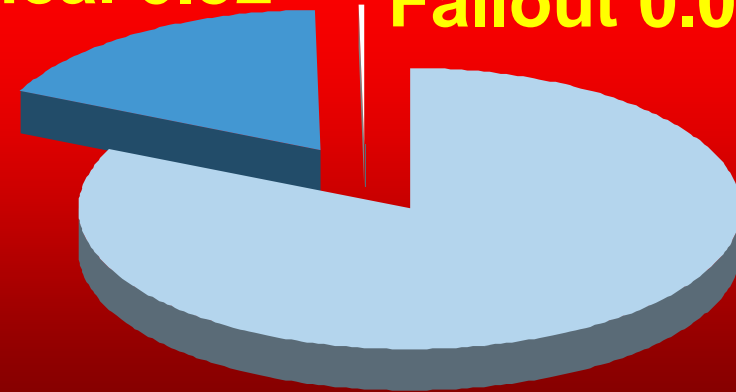
2007

Medical 0.4
All other 0.008



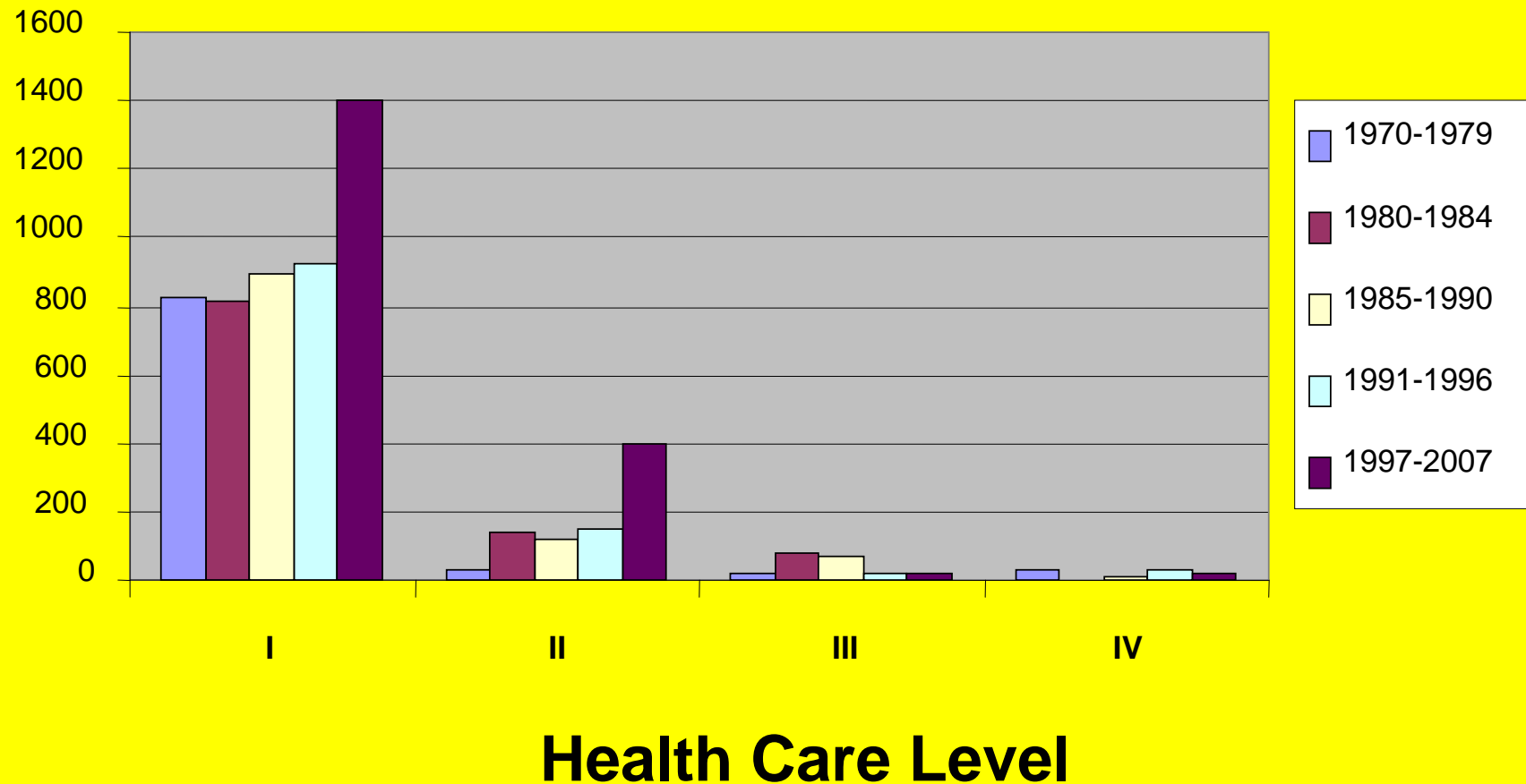
Natural 2.4

Medical 0.52
Fallout 0.005



Natural 2.4

Temporal trends in the frequency per 1000 Population of diagnostic radiology examinations



Source: UNSCEAR



FACTS

- ✓ The medical exposure is by far the **largest** radiation source other than natural background
- ✓ The availability and use of medical radiation facilities varies **widely** around the world.
- ✓ In some industrialized countries medical exposure is **already** the largest source of exposure.
- ✓ Medical exposure is different from other uses of radiation: too little or too much dose is **bad** in both diagnosis and therapy.
- ✓ There is minimally **trained staff** causing unsafe radiation conditions for patients.
- ✓ Medical exposure is the **less regulated** type of exposure.



CHALLENGES

Technological

Regulatory

Application of the BSS

- ✓ **Justification**
- ✓ **Optimization**
- ✓ **Dose limitation**

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TECHNOLOGICAL

- ❖ PET/CT incorporation worldwide
- ❖ Complex radiotherapy techniques: IMRT & IGRT
- ❖ MDCT: 64, 128, 256...
- ❖ Usage of CT for clinical and also for screening purposes
- ❖ Image guided intervention procedures
- ❖ Development of hybrid imaging modalities
- ❖ Change in the pattern of usage : children & young

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DOSE TRENDS PER PROCEDURE

<i>Examination</i>	<i>Average effective dose per examination (mSv) Health care level I</i>			
	<i>1970–1979</i>	<i>1980–1990</i>	<i>1991–1996</i>	<i>1997–2007</i>
Chest radiography	0.25	0.14	0.14	0.07
Abdomen x-ray	1.9	1.1	0.53	0.77
Mammography	1.8	1	0.51	0.26
CT scan	1.3	4.4	8.8	7.4
Angiography	9.2	6.8	12	9.6

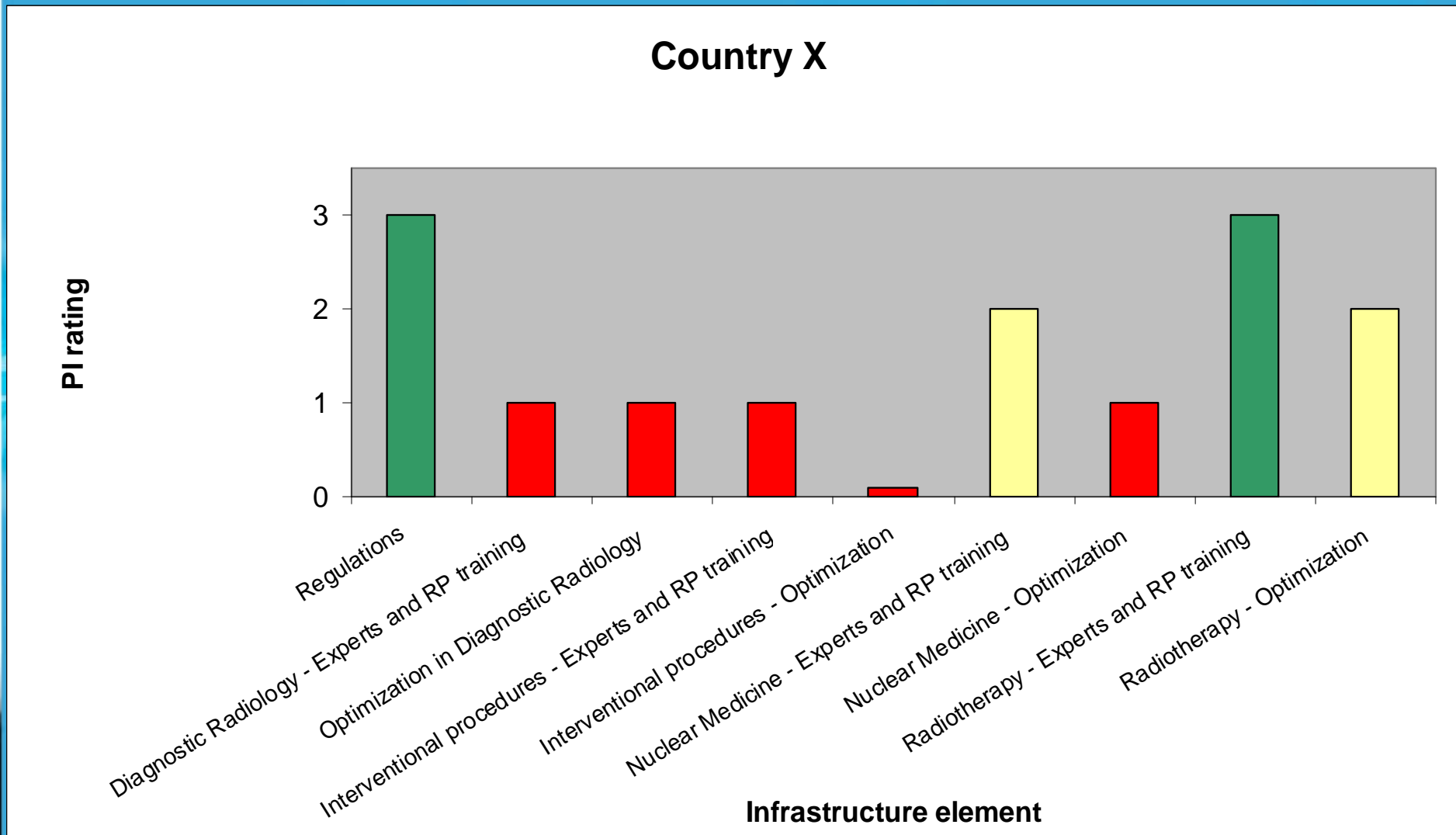
Source: UNSCEAR

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APPLICATION OF BSS

Country status - example

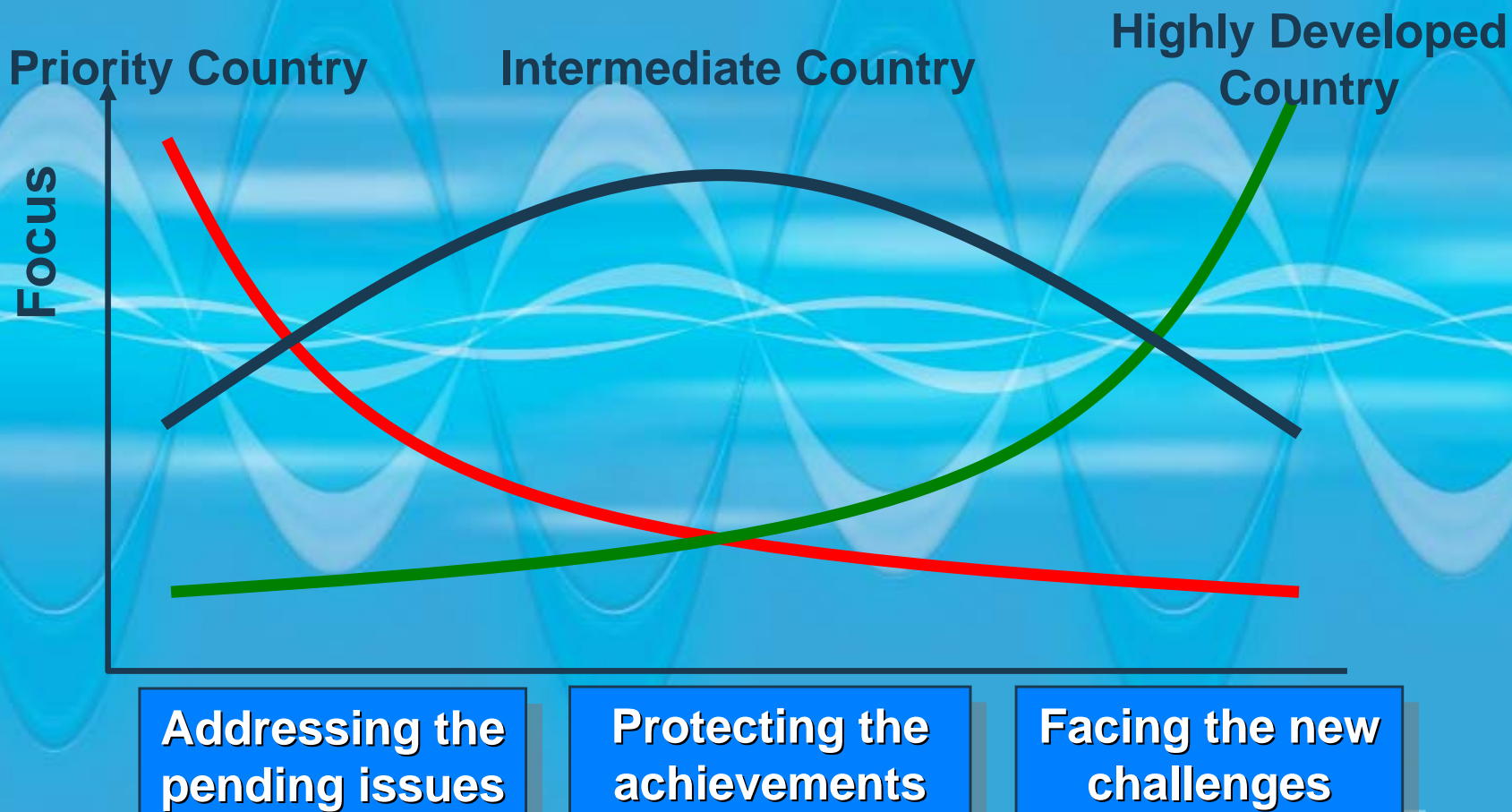


Source: IAEA

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EACH COUNTRY HAS DIFFERENT NEEDS FOR HARMONIZATION



Source: PAHO

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JUSTIFICATION

Generic justification: health authorities and medical professional societies

Individual justification: referring and radiological medical practitioner

- **Particular attention to pregnant, breast-feeding and paediatric patients**

Opportunistic screening:

- **health authorities should be able control and influence the process through policies**
- **assure patient is informed about benefits, risks and limitations**

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OPTIMIZATION OF PROTECTION

- Calibration of equipments and performing the clinical dosimetry by a medical physicist.
- Implementing a QA program under the supervision of a medical physicist
- Performing QC tests at the time of acceptance & commissioning, periodically thereafter, and after any major maintenance that could affect patient safety

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DOSE LIMITATION

Dose limits **do not apply** to medical exposures

There is need for the establishment of

- ✓ Diagnostic Reference Levels as dynamic values which are tools for **optimization** (not "limits");
- ✓ Dose constraints (not "limits") for carers and comforters as well as for volunteers in biomedical research
- ✓ In consultation between **Health Authorities**, medical professional societies and the Regulatory Body



CHALLENGES (I)

- ❖ New and rapidly evolving technologies raise new issues
- ❖ The implementation of QA programs to improve **clinical outcome** and assure radiation safety
- ❖ Qualified personnel, particularly of medical physicists
- ❖ Health professionals properly and regularly trained in radiation protection

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CHALLENGES (II)

- ❖ Implementation of appropriate **regulations**
- ❖ **Health authorities** and medical professionals societies participation in the regulation of medical exposures
- ❖ Regulatory Body may mean **more than one body** each having different responsibilities
- ❖ Closer relationship between the Regulatory Body and Health Authorities
- ❖ Harmonization and better coordination among multiple stakeholders

