



# Challenges in implementing radiation medicine

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Tatul Saghatelyan

National Center of Oncology, Yerevan, Armenia

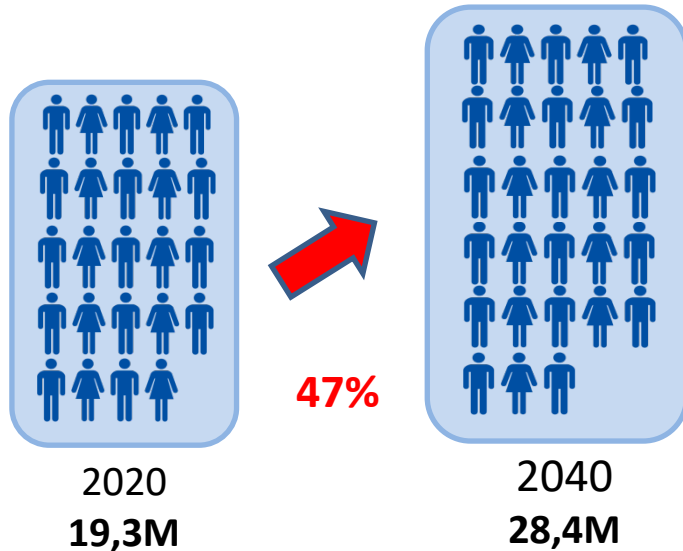


2022

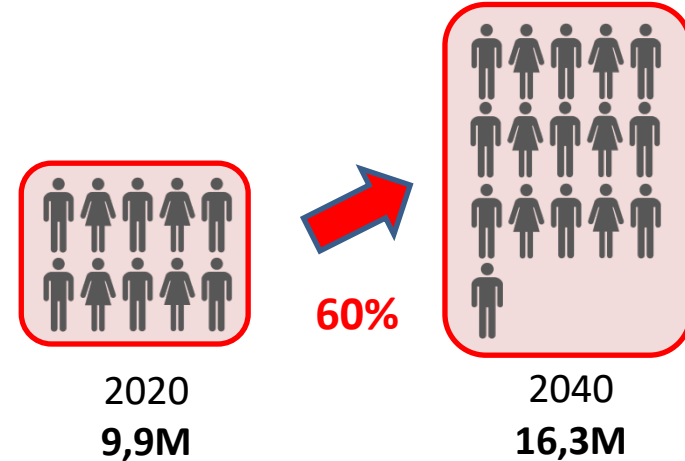
# Global Cancer Data

Source: IARC,  
GLOBOCAN, 2020

## New Cases (Incidence)

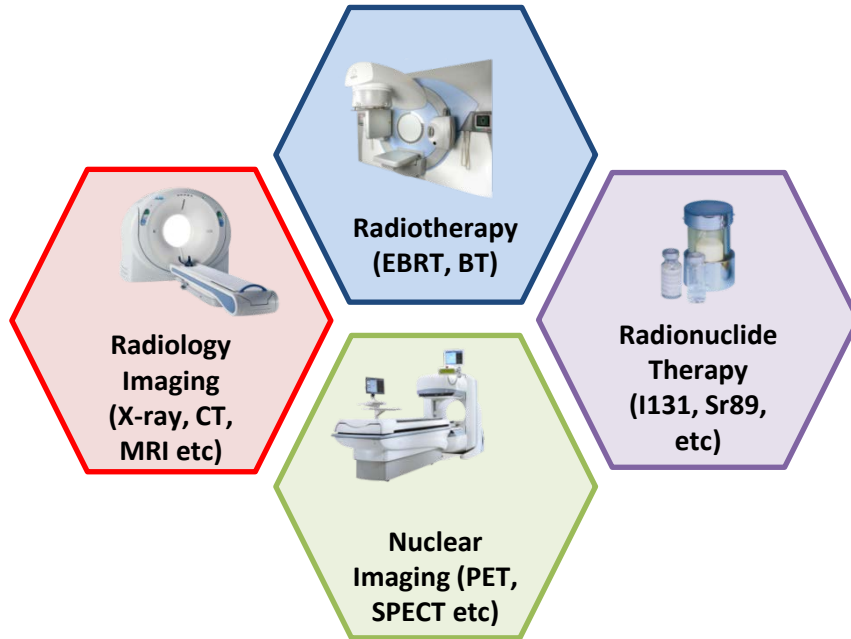


## Deaths (Mortality)



**!** > 60% of cancer cases and >70% of deaths are in LMIC with ~5% of oncology resources...

# Radiation technologies in cancer management



- Radiation therapy is:
  - one of the 3 pillars in cancer treatment (*along with surgery and systemic treatments*)
  - Essential treatment modality in >50% of cancer patients
  - “Responsible” for 40% of cases of cure from cancer (*surgery-49%, chemotherapy-11%*)
  - Very cost effective (*5-7% of cancer treatment costs*)

- Technology driven and technology dependent
- Related fields, similar challenges...

# Global shortage in radiotherapy resources

<b>Recommended (IAEA)</b>	<b>1 RT machine per 250.000 population</b>
High income countries	1 RT machine per 120.000 population
<b>Low income countries</b>	<b>1RT machine per &gt;2,000,000 population</b>
<b>Average in world</b>	<b>1RT machine per 500,000 population</b>

## Developing Index Table

IncomeGroup	Countries	Countries with RT	RT centers	MV Therapy	Light Ion Therapy	RT machines	Million population	Equipment per million population
<b>Grand Total</b>	<b>214</b>	<b>156</b>	<b>7704</b>	<b>14986</b>	<b>109</b>	<b>15095</b>	<b>7789</b>	<b>2</b>
High income (H)	74	60	4550	9299	98	9397	1215	8
Upper middle income (UM)	54	44	2245	4100	10	4110	2584	2
Lower middle income (LM)	54	37	886	1546	1	1547	3324	0
Low income (L)	28	14	22	38	0	38	666	0
Temporarily unclassified (NC)	4	1	1	3	0	3	1	5

# Challenges

- **Need to comprehend the severity and scale of the problem**
- **Will and commitment for long-term actions**
- **Need for joint multistep, multifaceted, coordinated actions**

- Governments
- Regulatory bodies (Nuclear, Healthcare, Education, etc)
- International Organizations, Professional Societies, NGOs
- Business (incl. manufacturers)
- Radiation medicine specialists
- Other cancer specialists
- Society



## Challenges (continued)

- Upfront substantial investments for:
  - Equipment
  - Infrastructure
  - Specialist training

**Access to essential**

**Radiotherapy**



**Lives saved and economic returns**

**...“The cost of meeting 100% of global need for radiotherapy by 2035 in LMICs is estimated at USD 184 billion”...**

## Challenges (continued)

- Sustainability plan
  - Infrastructure (electricity, water supply, logistics etc.)
  - Maintenance and technical service
  - Replacement
  - Operational costs (incl. consumables, QA&QC, wages etc.)
  - Specialist training

# Challenges: Human resources

	High-income countries	Upper-middle-income countries	Lower-middle-income countries	Low-income countries
Fractions	76 424 000	77 014 000	40 974 000	13 268 000
Radiotherapy departments	4600	3700	2000	600
Megavoltage machines	9200	7400	3900	1300
CT scanners	4600	3700	2000	600
Radiation oncologists to be trained	15 500	16 800	9900	3300
Medical physicists to be trained	17 200	12 500	7200	2400
Radiation technologists to be trained	51 900	45 300	24 900	8100

Data are n. The appendix contains more information about the CT scanner shared-use model.

**Table 5: Projected fractions and related resources needed in 2035**

## Needs for specialists by 2035

- ROs – 45500
- MPs – 39300
- RTTs – 130200

In **Total- 215 000**



# Challenges: Human resources

- Scarcity or lack of dedicated training programs and resources for:
  - Radiation oncologists
  - Medical physicists
  - Radiotherapy technologists (RTT)



# Conclusions

- Radiation therapy is an established key component in cancer management;
- Access to this treatment modality remains unacceptably low in many countries, and the gap between demand and supply is growing
- Major challenges are:
  - Infrastructure and ecosystem;
  - Upfront Investments;
  - Sustainability provision;
  - Human resources.
- Joint multistep, multifaceted, coordinated actions are required.