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ART Presentation for Armenia Consolidated Data

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Access to Radiotherapy Technologies Study (ART)
in the Baltics, Eastern Europe, Central Asia and the Caucasus

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International Cancer Expert Corps

ISTC МНТЦ

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BALTIC states

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Armenia Data

	Year	Number
Population	2021	2,97M
GDP/Capita	2021	4,670.2
Life expectancy	2021	75.1
Mortality	2020	10 (per 1000)
Cancer incidence	2021	7640 (257.9 per 100K)
Cancer deaths	2021	5266 (177.8 per 100K)

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History of Radiation medicine in Armenia at a glance

1912	**First steps in the diagnostic use of X-rays;**
1927	First steps in therapeutic use of X-rays;
1946	Establishment of the Institute of Roentgenology and Radiology- currently - National Center of Oncology of the MoH of Armenia;
1975	Installation of the first brachytherapy unit with Cs^{137}
1980th	4 radiotherapy departments, 12 NM labs;
2003	First therapeutic linac (Russian made LUER-20M)
2006	CT based RT planning;
2014	First linac (ELEKTA Compact) with MLC and onboard MV imaging and transition from 2D to 3D-CRT
2014-2018	Wide implementation of 3-DCRT for most localizations (60%)
2018-19	Implementation of the Radioiodine treatment unit in the NCO and first use of radionuclide treatment in cancer
2021	**Initiation of the NCO's Capacity Building Project in Radiotherapy.**

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Cancer Centres and Radiotherapy Facilities

City	Center/Facility	Type of Cancer Treatment Modality: Radiation Therapy (Yes/No)	Type of Cancer Treatment Modality: Brachytherapy (Yes/No)	Type of Cancer Treatment Modality: Chemotherapy (Yes/No)	Number of Patients Treated Annually (2020 Number)
Yerevan	**NCO**	**Yes**	**Yes**	**Yes**	**>6000**
Yerevan	Ira Medical Group	Yes	No	No	350
Yerevan	Hematology Center	No	No	No	300
Yerevan	Mikaelyan UC	No	No	Yes	370
Yerevan	Erebuni MC	No	No	Yes	NA
Yerevan	Astghik MC	No	No	Yes	NA
Yerevan	Other	No	No	Yes	NA

*Nationwide electronic cancer registry has been implemented in 2022 and for earlier periods no reliable statistic is available from the most private hospitals.

Cancer Centres and Radiotherapy Facilities

***National Center of Oncology, Yerevan,* (NCO)**

- **The only public (and state-owned) tertiary cancer center in Armenia;**
- **All the relevant services for comprehensive cancer management, including specialized radiology, nuclear imaging, pathology, cancer surgery, medical oncology, radiation oncology.**

2 clinical departments practicing radiotherapy

- Radiation Oncology Department
- Radio-gynaecology Department

Covers about 80% of radiotherapy services in the country

and

A private initiative with 1 standalone Varian Clinac IX linac (IRA Medical group)

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Cancer Centres and Radiotherapy Facilities

- About 15 different medical institutions which practice chemotherapy and other drug therapies
- Several medical institutions, that practice cancer surgery but have no other components of cancer care
- The only PET/CT center with a (IBA Cyclone 18/18) cyclotron (2021) is currently operates as a standalone center
- Multiple standalone diagnostic radiology centers

! High fragmentation of cancer services is a big issue

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National Cancer Data

Cancer Patients	Number
• Curative	~80%
• Palliative	~20%
Four Most Commonly Treated Cancers by RT (Data of 2020)	
1. Breast (N=572) 2. Cervical (N=162) 3. Head&Neck (N=140) 4. Lung&bronchi (N=119)	

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Site	Incidence 2020	% from total	Needed RT	2020, Received RT	Optimal RTU (oRTU), (CCORE)	Actual RTU (aRTU)	Absolute difference	% of optimal RTU is covered, 2020
Breast	1143	16.5	994	572	87	50%	-422	58%
Lung% bronchi	779	11.2	600	119	77	15%	-481	20%
Colon	475	6.9	19	9	4	2%	-10	47%
Stomach	351	5.1	95	3	27	1%	-92	3%
Bladder	415	6.0	195	12	47	3%	-183	6%
CNS	176	2.5	141	77	80	44%	-64	55%
Prostate	343	4.9	199	48	58	14%	-151	24%
Thyroid	346	5.0	14	4	4	1%	-10	29%
Scin excl melanoma	244	3.5	122	11	50	5%	-111	9%
Cervical	206	3.0	146	162	71	79%	16	111%
Leukemia	183	2.6	37	6	20	3%	-31	16%
Myeloma	57	0.8	26	3	45	5%	-23	12%
Lymphomas	181	2.6	132	49	73	27%	-83	37%
Rectal and anal	253	3.6	152	79	60	31%	-73	52%
Endometrium	173	2.5	66	90	38	52%	24	137%
Ovary	192	2.8	8	1	4	1%	-7	13%
H&N	247	3.6	183	140	74	57%	-43	77%
Sarcomas	139	2.0	70	37	50	27%	-33	53%
Melanoma	55	0.8	12	2	21	4%	-10	17%
Kidney	137	2.0	21	4	15	3%	-17	19%
Testicular	29	0.4	2	0	7	0%	-2	0%
Pancreas	192	2.8	94	1	49	1%	-93	1%
Hepatobiliar	131	1.9	12	3	9	2%	-9	25%
Esophagus	37	0.5	26	11	71	30%	-15	42%
Lip	20	0.3	10	4	50	20%	-6	40%
Other	430	6.2	172	72	40	17%	-100	42%
Total	**6934**	**100.0**	**3545**	**1519**	**51.3%**	**22%**	**-2026**	**43%**

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Radiation Therapy Equipment

	Number	Data Source, Year
Brachytherapy units	**2**	
• Cobalt-60	1	NCO, BEBIG Saginova (installation is planned in Sept 2022)
• Iridium-192	1	NCO, Microselectron, 2007
Cobalt-60 External Beam RT units	**1**	Terabalt, 2006
Linear Accelerator units	**2**	
• Single energy	1	NCO, Elekta Compact, 2013
• Dual energy	1	IMG, Varian Clinac IX, 2017
• Electrons	1	IMG, Varian Clinac IX, 2017

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Medical Staff

Position	Senior (Number)	Junior (Number)	In Training (Number)	Year
Radiation Oncologists	8 (incl. 3 Radiogynecologists)	3 (incl. 3 Radiogynecologists)	3	2022
Medical Physicists	6	4	0	2022
Radiation Therapy Technologists	9	0	0	2022
Diagnostic Radiologists	>100	ND	~20	2022
Oncology Nurses	ND	ND	ND	

ND=no data

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Training Programmes

Programme	In-house (Yes/No)	Degree Awarding				Year
		BS (Number of degrees)	MS (Number of degrees)	PhD (Number of degrees)	MD-other (Number of degrees)	
Radiation Oncology	**Yes**	NA	NA	2	1	2022
Medical Physics	**Yes**	NA	NA	NA	NA	2022
Radiation Therapy Technology	**Yes**	NA	NA	NA	NA	2022
Diagnostic Radiology	**Yes**	NA	NA	2	1	2022
Oncology Nursing	**Yes**	NA	NA	NA	NA	2022

NOTE: No dedicated academical training programs for MPs, RTTs, and Oncology Nursing

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Access to Education, Training and Mentorship

Degree	Available (Yes/No)	Degree Type(s) (BS #, MS #, PhD #, MD-other #)
Diagnostic Radiology	Yes	MD, PhD, D.Sc
Radiation Oncology	Yes	MD, PhD, D.Sc
Medical Physics	No	Degrees are applicable to Physics in general or other sub-diciplines within Physics but not Med. Ph.
Radiation Therapy Technology	No	No
Oncology Nursing	No	No

In-house Opportunities	Available (Yes/No)	Programme Type(s)
Diagnostic Radiology	Yes	Residency in Diagnostic radiology
Radiation Oncology	Yes	3y residency with focus on RO 6 Month's fellowship for clinical oncologists,
Medical Physics	Yes	Hands-on training in Dep't+ International Training resources
Radiation Therapy Technology	Yes	Hands-on training in Dep't
Oncology Nursing	Yes	Hands-on training in Dep't

Access to Education, Training and Mentorship

International Exchanges, Collaborations and/or Trainings		
	Available (Yes/No)	**Programme Type(s)**
International Organization or Agency (ex. IAEA, WHO, UICC)	Yes	IAEA TC Projects (National, Regional International) OMI, Salzburg Seminars
Academic Medical Institutional Exchange (ex. University exchanges or trainings)	Yes	Limited Access (e.g. Erasmus+ for Physics)
Professional Societies (ex. ASTRO, ESTRO, ASCO)	Yes	ESTRO, ESMO, ASCO, ESMIT, ESO (Incl. Online resources)
Other	Yes	Bilateral Collaboration agreements • Gustave Roussy Cancer Center, Paris • Blokhin Cancer Research Center, Moscow • Petrov Institute, St Petersburg; etc.

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Radiation Safety Considerations

Radiation Safety Type	Policies and Procedures (Yes/No)	Regulatory/Oversight Body (Names)
Brachytherapy	Yes	ANRA Radiation Safety Officer (in NCO)
Diagnostic Imaging Equipment	Yes	ANRA Radiation Safety Officer (in NCO)
Cobalt-60 Units	Yes	ANRA Radiation Safety Officer (in NCO)
Linear Accelerators	Yes	ANRA Radiation Safety Officer (in NCO)

Radiation Safety Aspects

Radiation Safety Training Programs
Name of institution/name of program/certification: Armenian Nuclear Regulatory Authority, “Licensing of the Specialists in charge for the safe use of Atomic Energy”
Others:

Responsible Entity for Handling Radioactive Source Replacement Name of institution/name of program/certification	
Brachytherapy Units	ANRA/ «Radioactive Waste Disposal» CJSC
Cobalt-60 External Beam Treatment Units	ANRA/ «Radioactive Waste Disposal» CJSC

Challenges in Handling Radioactive Sources					
Funding (Yes/No)	**Lack of Storage Capacity** (Yes/No)	**Transportation** (Yes/No)	**Security** (Yes/No)	**Inspection** (Yes/No)	**Other** (Yes/No)
Yes	Yes	Yes	No	No	Yes

Armenia Challenges in Delivering Radiation Treatments

For each of the areas below, please provide short constructive comments describing primary challenges
Equipment: *Shortage of EBRT equipment; Lack of Equipment supporting IMRT/IGRT, VMAT, SRT/SRS; shortage of auxillary equipment (immobilisation, QA)*
Infrastructure: *Highly fragmented cancer services, underdeveloped safety infrastructure; shortage of HE bunkers*
Training and Education: *Lack of dedicated training recourses and accredited training programs for MPs, RTTs; suboptimal training atmosphere for Radiation Oncologists*
Finances: Common problem for all the developing countries. Upfront investments and sustainability models (wages for specialists!!!).
Policy: Underdeveloped regulational field; ✓ Who and how regulates this field? ✓Which minimum equipment, staffing, organizational structure should have an institution in Armenia to obtain a license to practice radiotherapy? ✓What are the roles and responsibilities of radiation oncologists, medical physicists, RTT's? ✓How and where should they be trained and accredited? ✓Poor understanding and knowledge of the policy makers and medical community of the role and indications of radiotherapy in cancer management.

Armenia Strategy…

Programmes and Initiatives	Present (Yes/No)	Description
National Cancer Control Plan	Yes	NCCP has been drafted by Cancer Control Coordination Council (MoH)
Cancer Registry	Yes	A nation-wide electronic Cancer Registry was implemented in 2022
International Assessments (ex. IAEA Impact Assessment)	Yes	WHO/IAEA imPACT mission, April 2019
Screening Programs/ Initiatives	Yes	• Breast Cancer Mammography screening program in rural regions, started in 2021 • Cervical Cancer Screening Program • Colorectal Cancer Endoscopy Screening Pilot Program, 2021
Raising Public Awareness, Advocacy, etc.	Yes	Patient Advocacy Organisations, Active work with Media and Social Networks; NCO outreach activities
Other:	Yes	NCO Radiation Oncology Capacity Building Project

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Achivements…

Several successfully completed IAEA TC projects with upgrading equipment (for about 2.5Mln EUR in 2006-2018) and training specialists;

- ✓ all the modern equipment in the departments are from IAEA TC projects;
- ✓ all the working specialists had training courses/ fellowships abroad, without which no any advancement could be achieved

Successfull transition from 2D RT to 3D-conformal radiotherapy and improvement of quality of radiotherapy in Armenia;

Implementation of Radioiodine therapy for thyroid cancer patients, for the first time in Armenia's history;

Incoming IAEA training fellowships (From the Middle Asian countries).

Future Perspectives…

NCO's Radiation Oncology capacity building project

- Construction of a new Technological Building is underway.
- 2 HE linacs with IMRT/IGRT, VMAT, SRS/SRT options
- New CT sim

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Future Perspectives…

- Several initiatives from private health institutions to establish a radiotherapy programme
- MoH efforts to develop and implement NCCP
- Discussions and initiatives to establish training programs for core radiotherapy specialists should be intensified in the light of recent development in the “market”
- Collaboration with international partners (IAEA and others)

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Thank you for your attention

- Questions?
- Comments?

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