XXXIII CONGRESSO NAZIONALE AIRO

AIRO2023

BOLOGNA,
27-29 OTTOBRE 2023
PALAZZO DEI CONGRESSI

Radioterapia Oncologica: l'evoluzione al servizio dei pazienti

Equità di accesso alle cure in Radioterapia

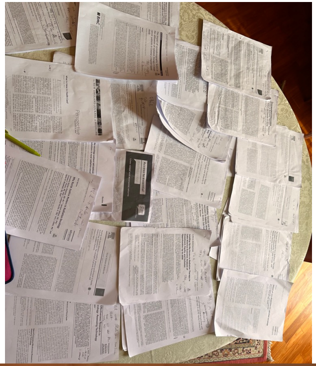
Cesare Guida
UO Radioterapia
Ospedale del Mare
Napoli

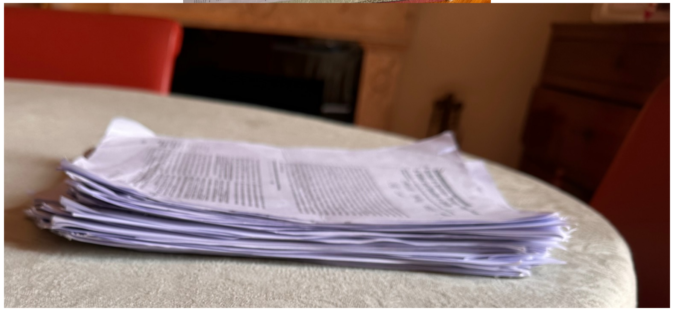
Associazione Italiana
Radioterapia e Oncologia clinica

Outline

1. Articoli della Costituzione Italiana
2. H.T.A.
3. Modalità di accesso (in particolare ai Protoni)
4. Differenze fra i sistemi regionali
5. Distribuzione delle tecnologie
6. PNNR

Sim 0-90°





BREAST CANCER

Access to Radiation Therapy and Related Clinical Outcomes in Patients With Cervical and Breast Cancer Across Sub-Saharan Africa: A Systematic Review

Sara E. Beltrán Ponce, MD[1]; Sarah Adamma Abunike, MBBS[2]; Jean C. Bikomeye, MPH[2]; Rita Sieracki, MLS[3]; Nixon Niyonzima, MBChB, MSc, PhD[4]; Pius Mulamira, MBChB[4]; Solomon Kibudde, MBChB, MMed[4]; Saryleine Ortiz de Choudens, MD[1]; Malika Siker, MD[1]; Christina Small MD, MPH[1]; and Kirsten M.M. Beyer, MBChB, MSc, PhD[2]

Author, Year	Country	1-Year OS	2-Year OS	5-Year OS	Other (Specified)
Cervical					
Simonds, 2018[84]	South Africa			71.95% (IIB) 49.7% (IIIB)	
Nartey, 2017[41]	Ghana	62.0%		30%	39% (3-year OS)
Moelle, 2018[91]	Ethiopia	84.0%	64.0%		
Grover, 2020[56]	Botswana				MS 550 days with CD4 nadir < 200 and 647 days with nadir > 200[b]
Grover, 2018[88]	Botswana		65.5% 65.0%[b]		
Einstein, 2019[97]	Multiple	76.3%[b,c]			
Asamoah, 2020[82]	Ghana	86.0% (IA) 100% (IIA) 95.0% (IIB) 90.0% (III)			
Chibonda, 2021[94]	Zimbabwe	94.0%a	95.0%a		
Adusei-Poku, 2017[80]	Ghana			41.0% (all patients) 86.7% (curative) 25.0% (palliative)	
MacDuffie, 2021[86]	Botswana			56.8%[b] 55.1%	
Khamis, 2021[81]	Tanzania			26.0%	Mean 33.9 months, MS 19 months
Grover, 2021[88]	Botswana	68.0% (IIIB)	59.0% (chemoRT) 41.0% (RT alone) 50% (IIIB)		43.0% (IIIB; 3-year OS)
Griesel, 2021[33]	Multiple	74.0%	51.3%		41.3% (3-year OS)
Deressa, 2021[35]	Ethiopia	77%	45.3%	28.4%	
Dereje, 2021[24]	Ethiopia	65.7%	32.6%		MS 21.2 months

Factors Increasing Likelihood of Seeking Care	Factors Decreasing Likelihood of Seeking Care
Positive awareness of cancer/family history[26]	Lack of awareness of cancer/education[23,24,29,33,40-42,66,89,122]
Strong support system[26,123]	Lack of health-seeking behaviors at symptom onset/underrating initial symptoms[23,33,67]
Protestant affiliation[40]	Preference to seek treatment from traditional or religious healers[23,31,40,41,66,89]
	Stigma, discrimination, and fear of ostracization from community[23,40,42,123]
	Fear of treatment itself[89]
	Low SES[24,31,66,89,122]
	HIV-positive status[a,31]
	Challenging referral system[72]
	Previous bad experiences in hospitals/health care[32]

Radiotherapy and Oncology 176 (2022) 83–91

Contents lists available at ScienceDirect

Radiotherapy and Oncology

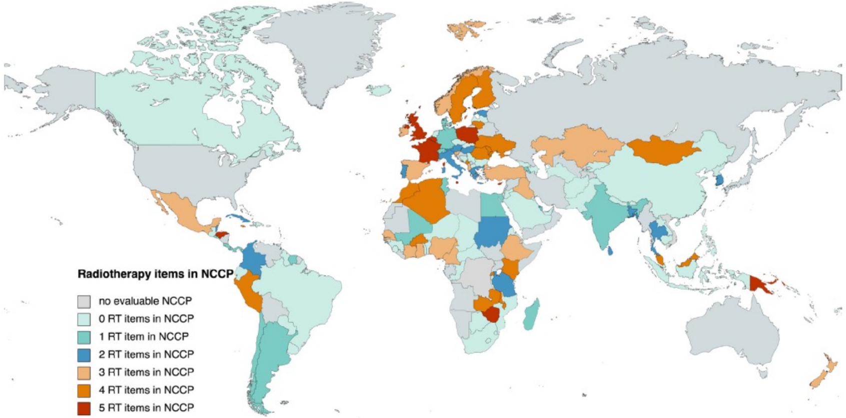
journal homepage: www.thegreenjournal.com

Original Article

Radiotherapy prioritization in 143 national cancer control plans: Correlation with radiotherapy machine availability, geography and income level

2015 : Global Task Force on Radiotherapy for Cancer Control

"80% of National Cancer Control Plans to include RT in 2020"



Only 55% NCCPs included any information regarding radiotherapy

Association between income level and radiotherapy and cancer service planning in NCCPs.

	Low Income	Low-middle Income	Upper Middle Income	High income	P value
NCCP Data (n = 185)	**N = 35**	**N = 44**	**N = 48**	**N = 58**	
NCCP Plan	26	21	24	24	**0.02**
No	(74.3%)9	(47.7%)23	(50%)24	(41.4%)34	
Yes	(25.7%)	(52.3%)	(50%)	(58.6%)	

TGlobal Task Force on Radiotherapy for Cancer Control (2013)

Investment needed to achieve global equity in access by 2035

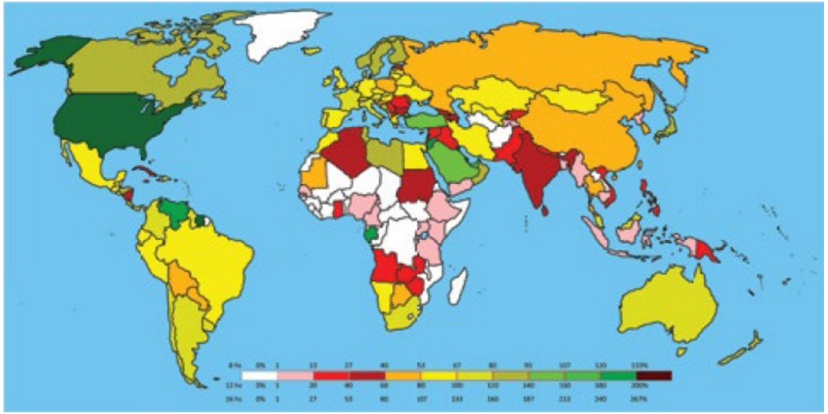
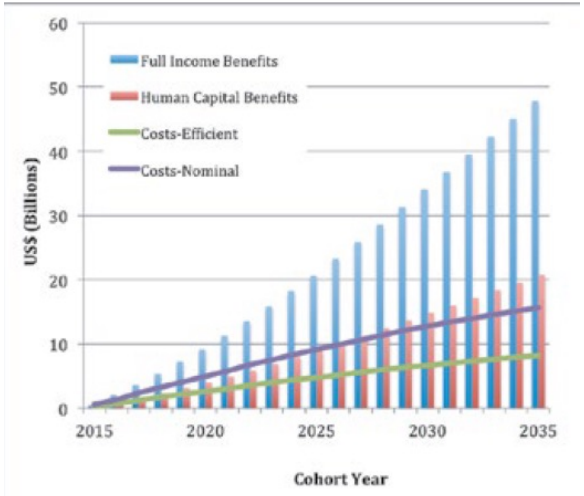


Figure 1. Global distribution of radiotherapy facilities.

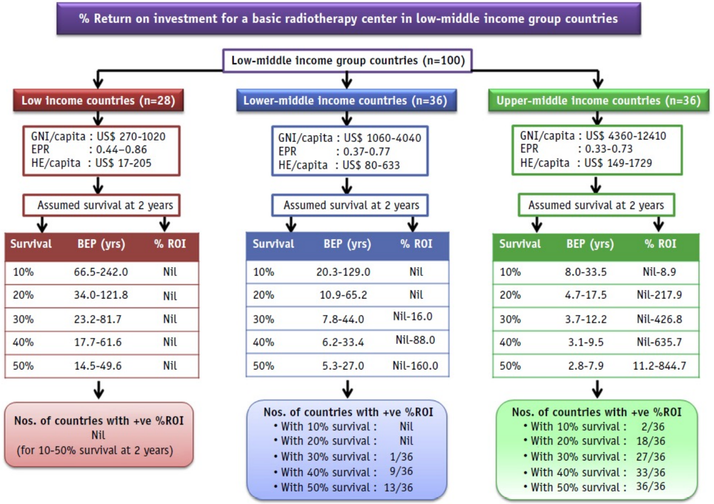


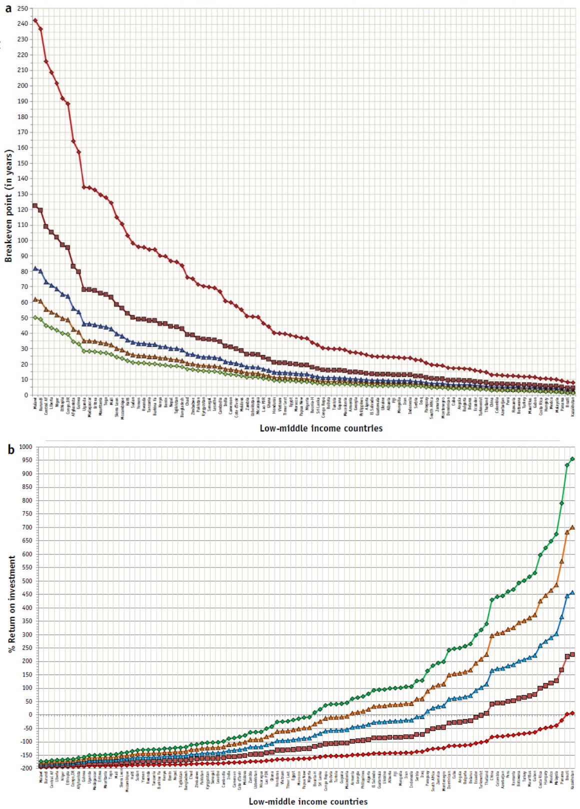
To meet 100% of global need for radiotherapy by 2035 in LMICs : - $ 184 billion.

27 milion life-years saved in LMICs: + $ 278 billion.

Are State-Sponsored New Radiation Therapy Facilities Economically Viable in Low- and Middle-Income Countries?

Niloy R. Datta, MD,* Massoud Samiei, PhD,† and Stephan Bodis, MD‡





%ROI dependent : GNI per capita, employment/population ratio , 2-year OS

None of the low-income countries would attain an ROI.

Shahrabi Farahani *et al. International Journal for Equity in Health* (2021) 20:152
https://doi.org/10.1186/s12939-021-01497-0

International Journal for Equity in Health

RESEARCH **Open Access**

The impact of sociodemographic factors on the utilization of radiation therapy in breast cancer patients in Estonia: a register-based study

Fereshteh Shahrabi Farahani[1], Keiu Paapsi[2] and Kaire Innos[2*]

	Radiation therapy use (n=4312) [a]		Univariate PRR (95% CI)	Multivariate PRR (95% CI)
	No.	%		
Total	2954	68.5		
Period of diagnosis				
2007–2009	569	56.6	Ref	Ref
2010–2012	727	66.5	**1.18 (1.10–1.26)**	**1.18 (1.10–1.26)**
2013–2015	759	71.6	**1.27 (1.18–1.35)**	**1.26 (1.18–1.35)**
2016–2018	899	78.0	**1.38 (1.30–1.47)**	**1.37 (1.29–1.45)**
Age at diagnosis (years)				
<50	802	66.5	**0.94 (0.89–0.99)**	0.96 (0.91–1.01)
50–59	1126	70.9	Ref	Ref
60–69	1026	67.6	0.95 (0.91–1.00)	0.95 (0.91–1.00)
TNM stage				
I	1236	77.7	Ref	Ref
II	1140	60.2	**0.77 (0.74–0.81)**	**0.79 (0.75–0.82)**
III	578	69.9	**0.90 (0.85–0.95)**	**0.93 (0.88–0.98)**
Nationality				
Estonian	1805	68.9	Ref	Ref
Other nationalities	1149	67.9	0.98 (0.94–1.03)	0.98 (0.93–1.02)
Region of residence				
North	1340	67.6	Ref	Ref
West	296	65.8	0.97 (0.90–1.05)	0.99 (0.92–1.07)
Central	249	68.4	1.01 (0.94–1.09)	1.01 (0.94–1.09)
North-East	397	69.0	1.02 (0.96–1.09)	1.04 (0.98–1.11)
South	672	71.3	1.05 (1.00–1.11)	1.04 (0.99–1.10)
Educational level				
University degree	874	69.2	Ref	Ref
Secondary plus vocational studies	846	70.6	1.02 (0.97–1.07)	1.02 (0.97–1.08)
Secondary studies	1036	68.5	0.99 (0.94–1.04)	1.01 (0.96–1.06)
Basic and primary studies	198	58.6	**0.85 (0.77–0.93)**	**0.88 (0.80–0.97)**
Marital status				
Married	1395	71.2	Ref	Ref
Divorced/widowed	1193	66.6	**0.93 (0.90–0.98)**	**0.95 (0.91–0.99)**
Single	366	65.2	**0.92 (0.86–0.98)**	**0.92 (0.86–0.99)**

AIRO2023

Radioterapia Oncologica: l'evoluzione al servizio dei pazienti

Journal of Medical Imaging and Radiation Oncology **65** (2021) 410–417

RADIATION ONCOLOGY—ORIGINAL ARTICLE

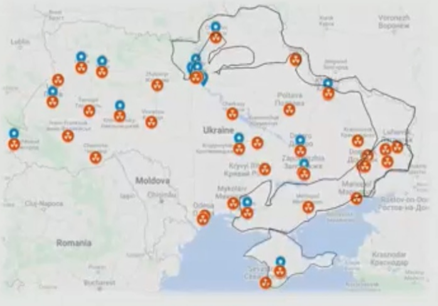
Equity should know no borders: The role of Australasian radiation oncologists in supporting radiation oncology services in low- and middle-income countries in the Asia-Pacific

Sean Hassan,[1] Andrew Oar,[2] Iain Ward,[3] Eng-Siew Koh,[4,5,6] Thomas P Shakespeare[4,7] and

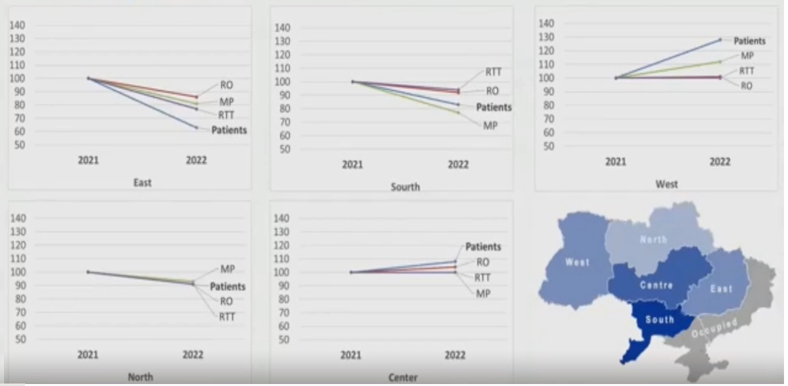
Country	Site	Involvement
Cambodia	National Cancer Centre, Calmette Hospital, Phnom Penh	Australia volunteer trainers based in Phnom Penh, reciprocal training visits and ongoing educational support
Fiji	Suva Cancer Centre, Suva	Participation in Programme of Action for Cancer Therapy and IAEA advisory mission
India	Christian Medical College, Vellore, Tamil Nadu	Mentoring and educational sessions
India	Adyar Cancer Institute, Chennai, Tamil Nadu	Mentoring and educational sessions
India	Tata Memorial Hospital, Mumbai	Mentoring and educational sessions
Malaysia	Advanced Medical and Dental Institute (AMDI) of Universiti Sains Malaysia (USM), Penang	Knowledge sharing visit
Malaysia	National Cancer Institute, Malaysia	Assistance with the introduction of prostate brachytherapy
Mongolia	Nationale Cancer Centre Mongolia	Assistance with the establishment of the first linear accelerator with further
Papua New Guinea	Port Moresby, Papua New Guinea	Periodic commissioning checks of equipment and remote support
Papua New Guinea	Port Moresby, Papua New Guinea	Continuing professional development
Sri Lanka	National Cancer Centre, Maharagama	Mentoring and educational sessions
Sri Lanka	Tellippalai Cancer Centre, Tellippalai, Jaffna	Linear accelerator setup
Vietnam	Ho Chi Min City Oncology Hospital, Ho Chi Min City; and Danang Hospital, Da Nang	Extensive and long-standing relationship across radiation oncology disciplines
Vietnam	Da Nang General Hospital & Da Nang Cancer Hospital, Da Nang	Knowledge sharing visit
Vietnam	Cho Ray Hospital, Ho Chi Minh	Formalised education sessions, preceptorships
Vietnam	Hue Hospital, Thien Hue	AVI mentoring placement at Hue Government Hospital Radiation Oncology Department
AP region		Leadership in ESTRO APAC education committee

Radiotherapy during full scale invasion

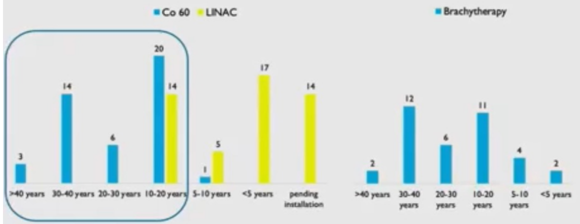
- 24th February 2022
  - Almost all RT centres suspended RT
  - the population began to move to the west of Ukraine and abroad, including patients and staff
- By Mid-March 2022
  - The invaders were stopped
  - Almost all RT centres in the north, east and south still not working due to proximities of hostilities or occupation
  - RT Centers in Central and West Ukraine resumed work



Territories occupied by Mid-March 2022 circled by a black line



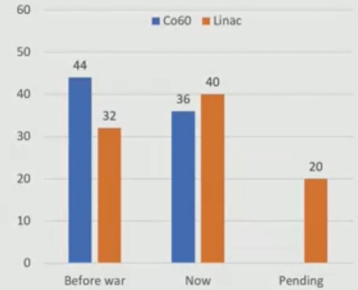
AGE OF RADIOTHERAPY EQUIPMENT

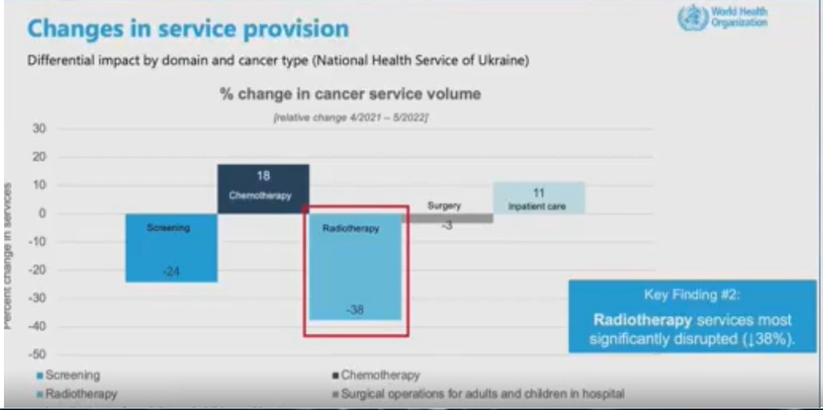


New equipment

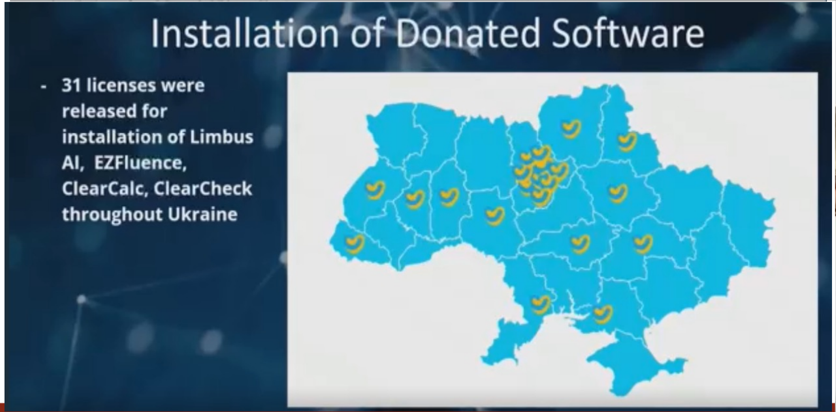
Until 2022 – till now:

- 8 Co-60 were decommissioned
- 8 new Linacs put into clinical use
- 5 new Linacs under Installation
- 15 new Linacs were purchased by Ministry of Health and must be installed in one-two years.




Changes in service provision
World Health Organization
Differential impact by domain and cancer type (National Health Service of Ukraine)
% change in cancer service volume
[relative change 4/2021 – 5/2022]
Percent change in services
30
20
10
0
-10
-20
-30
-40
-50
18
Chemotherapy
Screening
-24
Radiotherapy
-38
Surgery
-3
11
Inpatient care
Key Finding #2:
Radiotherapy services most significantly disrupted (↓38%).
Screening
Chemotherapy
Radiotherapy
Surgical operations for adults and children in hospital


Pediatric radiotherapy still performed in Kyiv and Lviv with lineacs and dedicated teams


Installation of Donated Software
- 31 licenses were released for installation of Limbus AI, EZFluence, ClearCalc, ClearCheck throughout Ukraine


18 countries accepted more than 1500 Ukrainian children with cancer for treatment
USA
UK
Spain
Canada
Germany
Italy
France
The Netherlands
Switzerland

The Lancet Oncology Commission

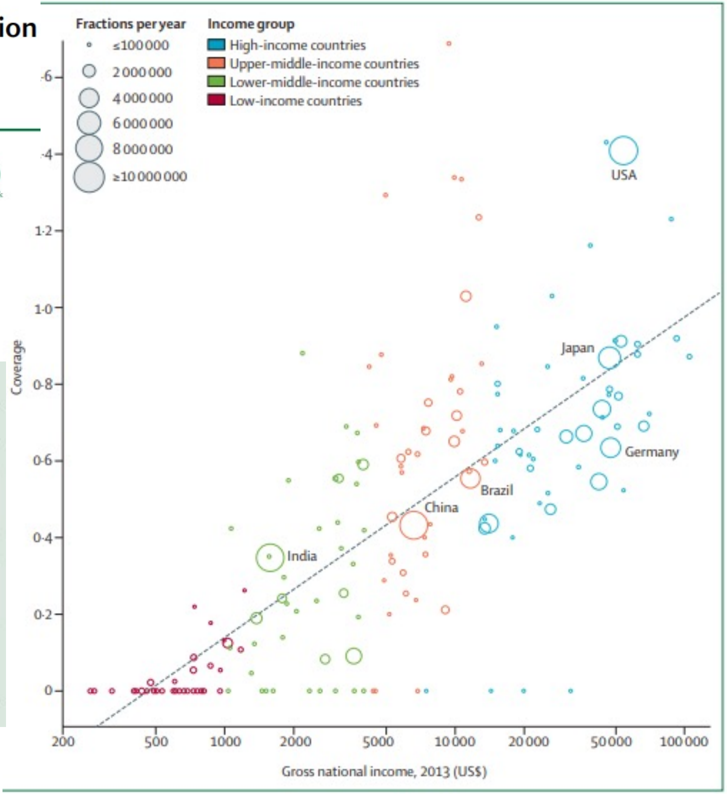
Expanding global access to radiotherapy

Rifat Atun, David A Jaffray, Michael B Barton, Freddie Bray, Michael Baumann, Bhadrasain Vikram, Timothy P Hanna, Felicia M Knaul,

	Low-income countries		Lower-middle-income countries		Upper-middle-income countries	
	Nominal	Efficiency	Nominal	Efficiency	Nominal	Efficiency
Net monetary benefit (US$, billions)						
Human-capital approach	–14·9	–2·4	–18·7	10·7	50·5	95·9
Full-income approach	0·265	12·8	38·5	67·7	239·3	284·7
Return on investment (US$, billions)						
Human-capital approach	–0·56	–0·17	–0·3	0·32	0·53	1·94
Full-income approach	0·01	0·91	0·62	2·03	2·52	5·77

Net monetary benefit=cost of investment – economic return. Return on investment=net monetary benefit / cost of investment. Costing models are described in the text and include both operational and capital costs.

Table 6: Cost and benefits of investments to scale up radiotherapy services in low-income and middle-income countries, 2015–35



igure 10: Radiotherapy coverage as a function of gross national income

The Lancet Oncology Commission

Expanding global access to radiotherapy

Rifat Atun, David A Jaffray, Michael B Barton, Freddie Bray, Michael Baumann, Bhadrasain Vikram, Timothy P Hanna, Felicia M Knaul,

Call for actions:

- Population based cancer control plans
- Expansion of access to radiotherapy
- Human resources for radiotherapy
- Sustainable financing to expand access to RT
- Align radiotherapy access with universal health coverage

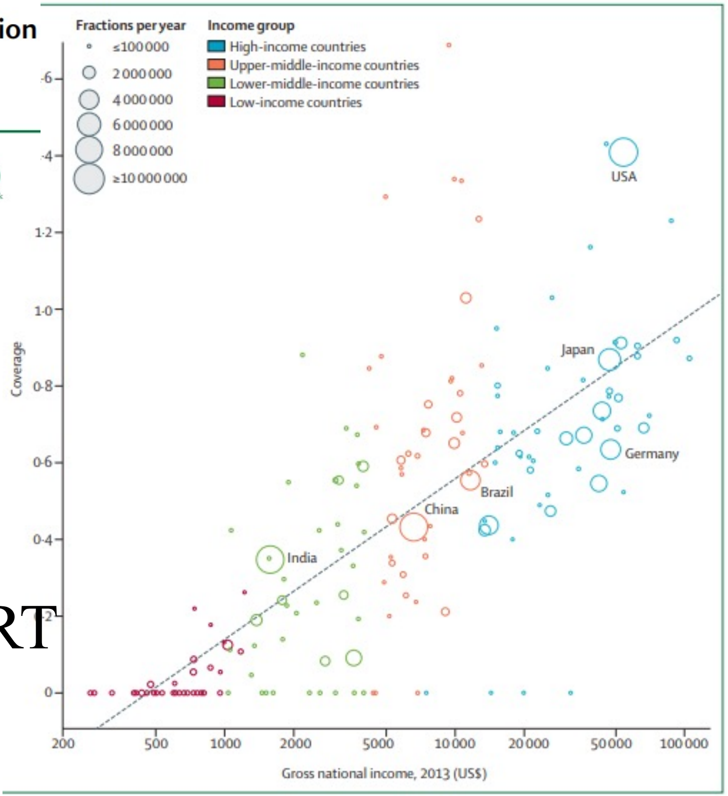
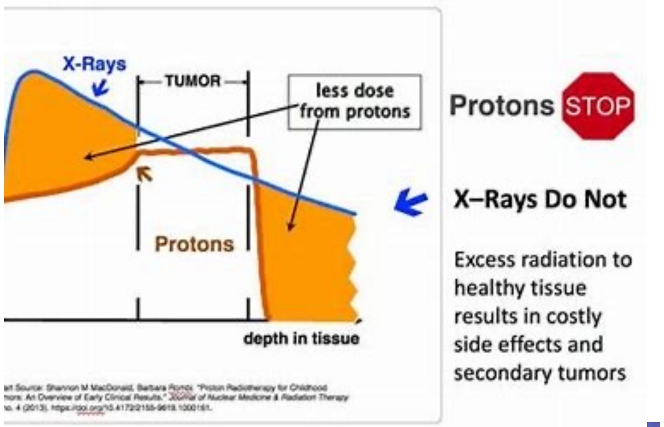
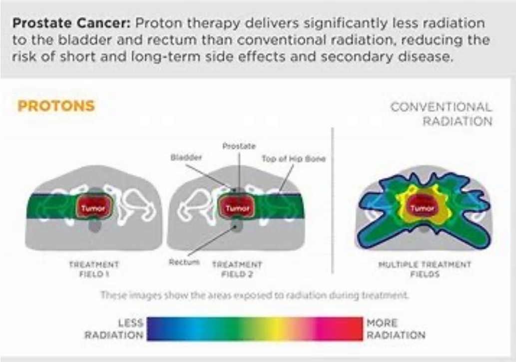


Figure 10: Radiotherapy coverage as a function of gross national income


X-Rays
TUMOR
less dose from protons
Protons
depth in tissue
Protons STOP
X–Rays Do Not
Excess radiation to healthy tissue results in costly side effects and secondary tumors


EFFECTIVE TREATMENT OF CANCER THRU ADVANCED PROTON THERAPY


Apollo
PROTON
Cancer Centre


Prostate Cancer: Proton therapy delivers significantly less radiation to the bladder and rectum than conventional radiation, reducing the risk of short and long-term side effects and secondary disease.
PROTONS
CONVENTIONAL RADIATION
Bladder
Prostate
Top of Hip Bone
Tumor
Rectum
TREATMENT FIELD 1
TREATMENT FIELD 2
MULTIPLE TREATMENT FIELDS
These images show the areas exposed to radiation during treatment.
LESS RADIATION
MORE RADIATION

Lit. Search:

Population
Intervention
Comparison
Outcome
Criteria

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Contents lists available at ScienceDirect

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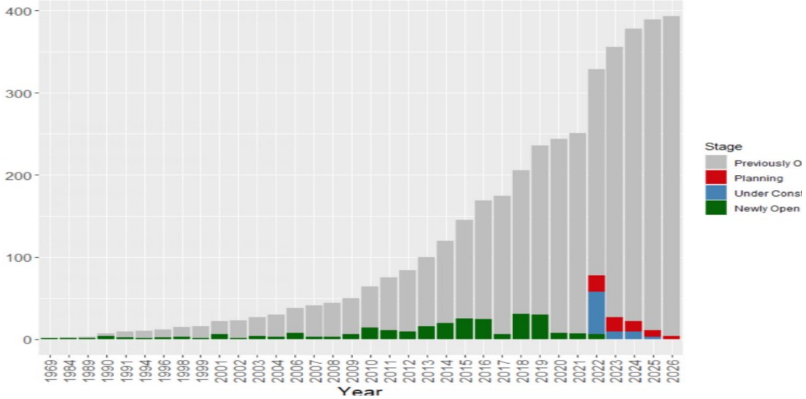
journal homepage: www.clinicaloncologyonline.net

Overview

Assessing Equity of Access to Proton Beam Therapy: A Literature Review

S. Gaito *†‡, M.C. Aznar †, N.G. Burnet ‡, A. Crellin †§, A. France *, D. Indelicato ¶, K.J. Kirkby †‡, S. Pan ‡, G. Whitfield †‡, E. Smith *†‡

* Proton Clinical Outcomes Unit, The Christie NHS Proton Beam Therapy Centre, Manchester, UK



Papers 24/224

Paediatrics vs Adults 60 vs 40%

Study	Author [reference]	Year	Country	Age group	Factors discussed*	Cancer diagnosis	Disparity	Data source
1	Gardner *et al.* [15]	2022	USA	A	1,3,6	Prostate	Yes	Literature search
2	Mailhot Vega *et al.* [16]	2022	USA	C	6	Thorax (mediastinum)	Yes	COG
3	McCall *et al.* [17]	2022	USA	A	1,2,3,4,6	Head and neck	Yes	National cancer database
4	Nogueira *et al.* [18]	2022	USA	A + C + TYA	1	Eligible indications for PBT	Yes	National cancer database
5	Thijssen *et al.* [19]	2022	Netherlands	A	2	Thorax	Yes	National survey
6	Xia *et al.* [20]	2022	WW	A + C + TYA	3	Eligible indications for PBT	Yes	Cross-sectional study
7	Bishop *et al.* [21]	2021	USA	C + TYA	4,6	Eligible indications for PBT	Yes	Cross-sectional study
8	Maillie *et al.* [22]	2021	USA	A + C + TYA	1,2,3	Eligible indications for PBT	Yes	National cancer database
9	Ansinelli *et al.* [23]	2020	USA	A	2	Thorax	Yes	National cancer database
10	Bitterman *et al.* [24]	2020	USA	C	1,2	Eligible indications for PBT	Yes	COG
11	Parikh-Patel *et al.* [25]	2020	USA	A + C + TYA	1,2,3,4,5,6	Eligible indications for PBT	Yes	National cancer database
12	Lee *et al.* [26]	2019	USA	A	1,2,3,4	Head and neck	Yes	National cancer database
13	Khan *et al.* [27]	2017	USA	C	2,3,4,6	CNS	Yes	National cancer database
14	Kopecky *et al.* [28]	2017	USA	C	3,6	CNS	Yes	National cancer database
15	Ning *et al.* [29]	2017	USA	A	6	Thorax	Yes	Single-institution database
16	Shen *et al.* [30]	2017	USA	C	3,4,6	Eligible indications for PBT	Yes	National cancer database
17	Woodhouse *et al.* [31]	2017	USA	A	1,2,3,4	Prostate	Yes	Single-institution database
18	Amini *et al.* [32]	2016	USA	A	1,2,3,4	Prostate	Yes	National cancer database
19	Floberg *et al.* [33]	2016	USA	C	2,3,4,6	CNS	Yes	National cancer database
20	Odei *et al.* [34]	2016	USA	C	2,3,4,6	CNS	Yes	National cancer database
21	Shen *et al.* [35]	2016	USA	C	1,3,4	Eligible indications for PBT	Yes	National cancer database
22	Arsenault *et al.* [36]	2012	USA	C	6	Eligible indications for PBT	Yes	National cancer database
23	Peterson *et al.* [37]	2022	USA	C	3	CNS	Yes	Literature search
24	Weil *et al.* [38]	2021	USA	C	1,2,3	CNS	Yes	National cancer database

Indicators of disparity:

1. Socioeconomic Status
2. Geographic Location
3. Insurance
4. Race
5. Age

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Overview

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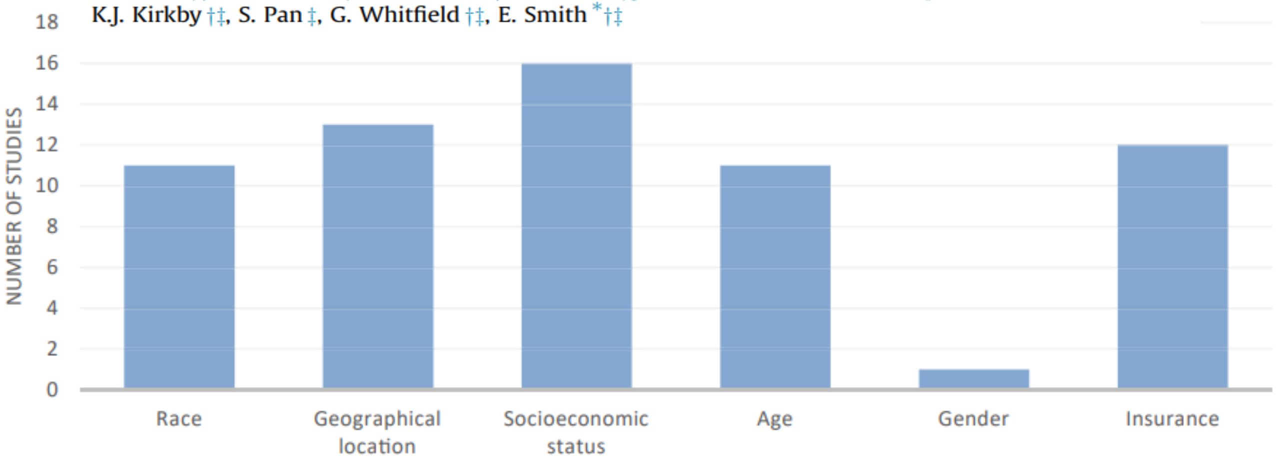
S. Gaito *†‡, M.C. Aznar †, N.G. Burnet ‡, A. Crellin †§, A. France *, D. Indelicato ¶, K.J. Kirkby †‡, S. Pan ‡, G. Whitfield †‡, E. Smith *†‡



Clinical Oncology 34 (2022) 247–257
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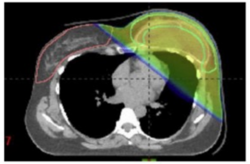
Original Article

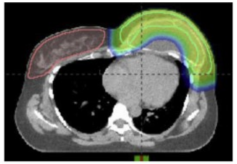
Model-Based Selection for Proton Therapy in Breast Cancer: Development of the National Indication Protocol for Proton Therapy and First Clinical Experiences

L.J. Boersma *, M.G.A. Sattler †‡, J.H. Maduro §, N. Bijker ¶, M. Essers ||, C.M.J. van Gestel **,

A

Dose distribution of photon plan (deep inspiration breath hold)	Dose distribution of proton plan (free breathing)
Mean Heart Dose = 6.0 Gy	Mean Heart Dose = 0.1 Gy
Mean Lung Dose = 6.8 Gy	Mean Lung Dose = 3.1 Gy
Mean Contralateral breast dose = 2.3 Gy	Mean Contralateral breast dose = 0.5 Gy





B

Only yellow marked cells are needed as input

Cumulative risk on ACE < 80 years of age		
Gender	female	
Age (years)	40	*between 40 and 70*
Mean Heart Dose (Gy)	6	*between 0 and 10*
Cardiac risk factors	no	
NTCP (%)	9,99%	

Only yellow marked cells are needed as input

Cumulative risk on ACE < 80 years of age		
Gender	female	
Age (years)	40	
Mean Heart Dose (Gy)	0,1	*between 0 and 10*
Cardiac risk factors	no	
NTCP (%)	6,97%	

DELTA NTCP (%)	3,02%
RESULT	PROTON

268 breast cancer / 2 years.

Protons always rembursed in:

- Paediatric tumours,
- Eye tumours
- Chordomas/Chondrosarcomas
- All the others: NTCP evaluation Prot vs Pho

Radiotherapy and Oncology 178 (2023) 109432

Contents lists available at ScienceDirect
Radiotherapy and Oncology
journal homepage: www.thegreenjournal.com

Original Article

Clues to address barriers for access to proton therapy in the Netherlands

Salina V. Thijssen [a], Liesbeth J. Boersma [a], Luca Heising [a,b], Rachelle R. Swart [a], Carol X. J. Ou [b],

Barriers	Subcategories	Interventions
Patient eligibility	Lack of knowledge	Educate and train ROs from referring RT centres; involve ROs from referring centres in developing NIPPs; make easily accessible information on eligibility
	Model-based indications	Add intuitive eligibility criteria; educate and train ROs from referring centres.
Logistics	Careful planning of concurrent chemo-and radiotherapy	Involve the other medical disciplines, such as medical oncologists, surgeons, pulmonologists, gastro intestinal oncologists.
	Increased lead time due to plan comparison	Submit the delineated planning CT immediately to the PTC, to enable simultaneous treatment planning of PT and photon plan; non-PTCs make a draft PT plan.
	Information exchange	Improve data exchange, reduce administration.
	Communication	Communication between non-PTC and PTC at several steps in the care-path: i.e. a priori eligibility, progress of plan comparison, developments during PT treatment, after PT treatment.
Travel	Information and burden	Assistance in travel and stay-arrangements, including a tool with overview of solutions.
Patients choice	Information and support	Install a case manager in the PTC; develop a decision aid; appoint a coordinating RO in the PTC for the referring RO.
	Shared Decision Making	Educate the referring RO, manage patient expectation by already mentioning PT early in the care-path, in the multidisciplinary team.
Perceived added value of PT	Scientific evidence	Collect more evidence by recording outcomes of treated patients, validation of the models; consider designing RCTs.
	Awareness	Knowledge-sharing between PTC and non-PTC, and also involve other medical professionals, such as medical oncologists, surgeons, pulmonologists, gastro intestinal oncologists.

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Radioterapia Oncologica:
l'evoluzione al servizio dei pazienti

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RADIATION ONCOLOGY • BIOLOGY • PHYSICS
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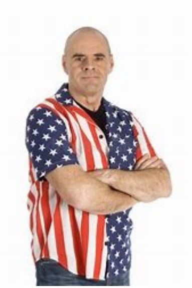
BRIEF REPORT

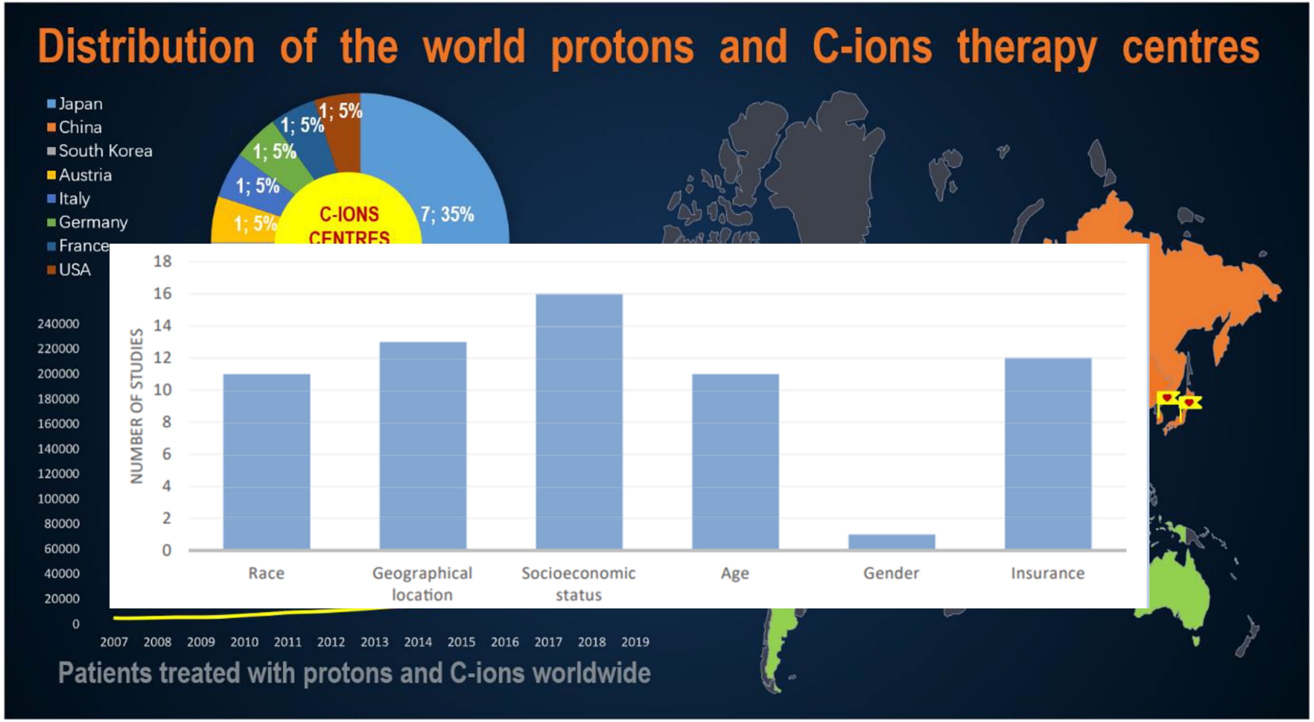
Proton Therapy in Canada: Toward Universal Access and Health Equity With a Publicly Funded Facility

Amir H. Safavi, MD, MSc,[*,†] Carolyn Freeman, CM, MBBS, FASTRO,[‡] Sylvia Cheng, MD, MScCH,[§] Samir Patel, MD,[‖] Gunita Mitera, PhD,[¶] Vijayananda Kundapur, MD,[#] Rob Rutledge, MD,[**] and Derek S. Tsang, MD, MSc[*,†]

Theme	Sources of inequity	Recommendations
Administration	No national database of patients treated with PBT in Canada	Individual patient-level data should be comprehensively collected and regularly reported on PBT utilization across clinical indications and socioeconomic groups
Comprehensiveness	Not all provinces and territories have a structured out-of-country PBT access program Eligibility criteria for PBT may differ between provinces	All provinces and territories should adopt national guidelines on equitable access to PBT[22]
Accessibility	Patients have difficulty accessing PBT because of financial barriers from indirect costs, travel barriers, and socioeconomic factors[3,24]	Multiple PBT facilities should be created across different geographic areas of the country to minimize patient travel time and expenses A travel grant should be created to support the indirect costs of PBT Lower- or no-cost accommodations near PBT centers should be made available to patients and their families A health equity approach should be used in the development of Canadian PBT programs

	Ontario[3]	Quebec[17]	British Columbia[18]	Alberta[19,24,25]	Manitoba	Saskatchewan	Nova Scotia and nearby Atlantic provinces
Population	14,223,942	8,501,833	5,000,879	4,262,635	1,342,153	1,132,505	969,383 (NS), 775,610 (NB), 154,331 (PEI)
Government program	Out-of-Country Prior Approval Program (Ontario Health)	Régie de l'assurance maladie du Québec	British Columbia Ministry of Health	Alberta Health Out-of Country Health Services Committee	Manitoba Health Out of Country Prior Approval Program	Out of country prior approval program provided by Ministry of Health through Saskatchewan Cancer Agency	Application is on a case-by-case basis to the provincial departments of health
General eligibility	Curative intent A subset of pediatric and adult cancers	Curative intent A subset of pediatric and adult cancers May be considered for second-line treatment Expected survival of >5 y ECOG PS 0-2 PBT should confer significant benefit over available radiation modalities	Curative intent A subset of pediatric and adult cancers	Curative intent A subset of pediatric and adult cancers Metastatic disease and reirradiation not excluded Expected survival of ≥5 y ECOG PS 0-2 Comparative proton and photon plans are generated for assessment of the magnitude of the potential benefit of PBT Age ≤40 y	Curative intent A subset of pediatric and adult cancers All cases discussed in dedicated disease site group rounds	Curative intent A subset of pediatric and adult cancers Expected survival of ≥5 y ECOG PS 0-2	Selected curative-intent pediatric cases
Examples of tumor types eligible	Medulloblastoma, ependymoma, Ewing sarcoma, orbital sarcoma, osteosarcoma, rhabdomyosarcoma, Hodgkin lymphoma, non-Hodgkin lymphoma, astrocytoma, adenoid cystic carcinoma, meningioma, craniopharyngioma, glioma, malignant myxoid lesion, thymic carcinoma	Intraocular melanomas Skull base and spinal chordomas Skull base chondrosarcomas Tumors whose treatment with photon therapy could damage adjacent tissues (eg, meningiomas, intracranial tumors, spinal and paraspinal soft tissue and bone sarcomas) Pediatric: ependymomas, craniopharyngiomas, PNET, Ewing sarcoma, pineal gland tumors, lymphomas, rhabdomyosarcomas, retinoblastomas	Medulloblastoma, ependymoma, malignant rhabdoid tumor, intracranial germ cell tumors, gliomas, pineal tumors, craniopharyngioma, vascular tumors, meningioma, CNS sarcoma, Ewing sarcoma, rhabdomyosarcoma, chordoma, neuroblastoma, Wilms tumor, Hodgkin lymphoma	All patients: chordoma, chrondrosarcoma, craniopharyngioma, CNS germ cell tumors, low-grade gliomas, AVM, mediastinal lymphoma; any other diagnosis can be approved by multidisciplinary tumor board Pediatric: any diagnosis requiring CSI, pituitary and pineal tumors, ependymoma, pelvic sarcomas, rhabdomyosarcoma, Ewing sarcoma Adults: paranasal sinus and nasal cavity tumors, intraocular melanomas not suitable for brachytherapy	Intraocular melanomas, Skull base and spinal chordomas Skull base chondrosarcomas Tumors whose treatment with photon therapy could damage adjacent tissues (eg, spinal area) Pediatric: ependymomas, craniopharyngiomas, PNET, Ewing sarcoma, pineal gland tumors, lymphomas, rhabdomyosarcomas, retinoblastomas Case-by-case evaluation permitted, depending on clinical scenarios	Intraocular melanomas Skull base and spinal chordomas Skull base chondrosarcomas Pediatric: ependymomas, craniopharyngiomas, PNET, Ewing sarcoma, rhabdomyosarcomas, optic nerve glioma, medulloblastoma	Medulloblastoma, ependymoma and other selected pediatric CNS tumors, highly selected non-CNS tumors
Requirement for expert case review	Reviewed by physicians selected by the program	Reviewed by the Comité provincial de protonthérapie	Reviewed by the institutional multidisciplinary tumor board	Reviewed at the CancerCare Alberta Proton Therapy Referral Rounds	Reviewed by the institutional multidisciplinary disease site group rounds attended by oncologists from all disciplines involved in the circle of care	Reviewed and recommended by site-specific radiation oncologist or by the institutional multidisciplinary tumor board	Reviewed and approved by tumor board and Department of Radiation Oncology
Medical costs of PBT	Covered	Covered	Covered	Covered	Covered, if approved. For approved cases: physician fees covered, at the same rate a Manitoba doctor would receive for similar services; and hospital bills, up to 75% of insured hospital services	Covered	Covered
Indirect costs of PBT	Not covered; transportation is often covered by philanthropic agencies for children only	Travel costs, including accommodation and transportation, are covered	Not covered	Flights for the patient and 1 parent or guardian for children are covered; housing, food, and transportation are often covered by philanthropic agencies for children only	For approved cases, may be reimbursed for reasonable transportation costs; accommodations, meals, taxis, ambulance, and other expenses are not covered	Adult patients may have to take separate insurances; for pediatric patients, depends on the referring facility giving a global package that also includes the stay, and food that will be paid as a package by the health ministry directly to the facility	Not covered




Distribution of the world protons and C-ions therapy centres
Japan
China
South Korea
Austria
Italy
Germany
France
USA
1; 5%
1; 5%
1; 5%
1; 5%
1; 5%
7; 35%
C-IONS
CENTRES
18
16
14
12
10
8
6
4
2
0
NUMBER OF STUDIES
Race
Geographical location
Socioeconomic status
Age
Gender
Insurance
240000
220000
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Patients treated with protons and C-ions worldwide

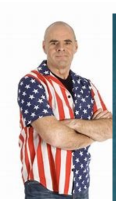
Journal of the International Neuropsychological Society (2023), **29**, 798–811
doi:10.1017/S1355617722000819

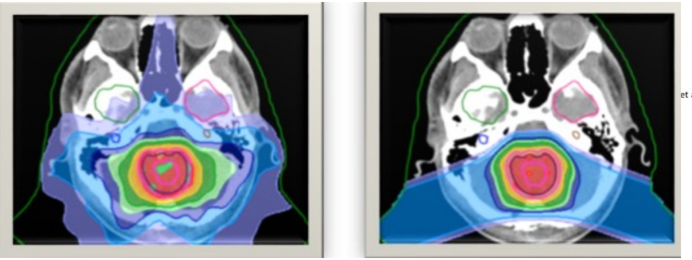
Critical Review

A systematic review of pediatric neuropsychological outcomes with proton *versus* photon radiation therapy: A call for equity in access to treatment†

Rachel K. Peterson[1,2] and Tricia Z. King[3,4]

Protons = Less neurophysiological sequaele





Conclusions:

Sociodemographic inequities in access to PRT

Reference	XRT sample	PRT sample	Differences between groups by medical[a] and/or sociodemographic variables	Relationship between demographics and neuro-psychological outcomes	Relationship between medical[a] and neuropsycho-logical outcomes
Child et al. (2021)	• 30 patients treated with XRT • 23 males • 16 Caucasian • 9 on government assistance • 13 medulloblastoma • 11 supratentorial	• 58 patients treated with PRT • 35 males • 33 Caucasian • 19 on government assistance • 19 medulloblastoma • 28 supratentorial	• Full posterior fossa boost (XRT > PRT, $p < .01$) • History of shunt placement (XRT > PRT, $p = .04$) • Lower Karnofsky/Lansky score (XRT > PRT, $p = .03$) • Time from RT to evaluation (XRT > PRT, $p < .01$) • CSI dose (XRT > PRT, $p = .04$)	• Did not examine relationships between sociodemographic and neuropsychological outcomes.	• Full posterior fossa boost predicted processing speed ($p = .03$) • Full posterior fossa boost predicted inattention ($p = .03$) • Full posterior fossa boost predicted academic fluency (all $p < .05$) • Karnofsky/Lansky score predicted processing speed ($p = .04$) • Karnofsky/Lansky score predicted inhibition/shifting ($p < .01$) • Karnofsky/Lansky score predicted writing fluency ($p = .02$)
Eaton et al. (2021)	• 20 patients treated with XRT • 10 males • Ethnicity not reported • Median household income: $60,990 • 20 medulloblastoma • 0 supratentorial	• 17 patients treated with PRT • 11 males • Ethnicity not reported • Median household income: $89,852 • 17 medulloblastoma • 0 supratentorial	• Median household income (XRT < PRT, $p < .01$)	• No association was found between median household income and neuropsychological outcomes.	• Did not examine relationships between medical and neuropsychological outcomes.
Fortin et al. (2017)	• 50 patients treated with XRT • Sex not reported • Ethnicity not reported • SES not reported • 10 medulloblastoma • Tumor location not reported	• 50 patients treated with PRT • Sex not reported • Ethnicity not reported • SES not reported • 10 medulloblastoma • Tumor location not reported	• Did not examine differences between sociodemographic or medical variables by treatment groups	• Did not examine relationships between sociodemographic and neuropsychological outcomes.	• Did not examine relationships between medical and neuropsychological outcomes.
et al.	• 67 patients treated with XRT • 37 males • 38 Caucasian • 39 Average SES • 41 medulloblastoma • 23 supratentorial	• 58 patients treated with PRT • 37 males • 36 Caucasian • 34 Average SES • 26 medulloblastoma • 35 supratentorial	• Non-Caucasian patients (XRT > PRT, $p = .02$) • SES status (XRT < PRT, $p = .03$) • Time from RT to evaluation (XRT > PRT, $p < .001$) • Posterior fossa tumor location (XRT > PRT, $p < .01$) • Use of adjuvant carboplatin (XRT < PRT, $p = .04$) • Use of adjuvant cisplatin (XRT > PRT, $p < .05$)	• Lower SES was associated with VCI ($p = .02$), PRI ($p = <.01$), story memory ($p = .02$), and math calc ($p < .01$). • Non-Caucasian ethnicity associated with story memory ($p = .03$)	• Younger age at RT was associated with VIQ ($p = .01$), attention ($p = .04$), and conceptual adaptive skills ($p = .03$). • Hydrocephalus with shunting associated with FSIQ/GAI ($p = .05$), story memory ($p = .04$), math calculation ($p = .04$). • CSI at 23.4 Gy associated with PIQ ($p = <.001$), VMI ($p = .04$) • CSI at 36 Gy associated with PSI ($p = .03$), VMI ($p = .04$), math calc ($p = .03$). • Posterior fossa syndrome associated with PSI ($p = .04$). • Time from RT to evaluation associated with VMI ($p = .03$)
Kahalley et al. (2020)	• 42 patients treated with XRT • 27 males • Ethnicity not reported • Mean maternal education 14 years • Mean paternal education 15 years • 42/42 medulloblastoma • 0 supratentorial	• 37 patients treated with PRT • 26 males • Ethnicity not reported • Mean maternal education 14 years • Mean paternal education 15 years • 37/37 medulloblastoma • 0 supratentorial	• Larger boost margin (XRT > PRT, $p = .001$) • Total RT dose to tumor bed + margin (XRT > PRT, $p < .001$)	• Did not examine relationships between sociodemographic and neuropsychological outcomes.	• Posterior fossa syndrome was associated with lower FSIQ ($p = .008$) • Posterior fossa syndrome was associated with lower perceptual reasoning ($p = .001$) • Posterior fossa syndrome was associated with lower working memory ($p = .001$) • Posterior fossa syndrome was associated with lower processing speed ($p = .001$)
Kahalley et al. (2016)	• 60 patients treated with XRT • 33 males • 22 Caucasian • 15.2% of households in poverty in zip code • 28 medulloblastoma	• 90 patients treated with PRT • 54 males • 46 Caucasian • 12.6% of households in poverty in zip code • 34 medulloblastoma	• Non-medulloblastoma tumor histology (XRT < PRT, $p = .002$) • History of craniotomy (XRT < PRT, $p = .05$) • History of VP shunt (XRT > PRT, $p = .01$) • Lower Karnofsky/Lansky score (XRT > PRT, $p = .03$)	• Lower FSIQ associated with Black race ($p = .023$) • Lower FSIQ associated with Hispanic ethnicity ($p = .008$) • FSIQ associated with Leiter IQ test ($p = .001$) • FSIQ associated with lower SES ($p = .004$)	• FSIQ associated with K/L score <80 ($p = .001$) • FSIQ associated with younger age at RT ($p = .029$) • FSIQ associated with infratentorial tumor location ($p = .024$) • FSIQ associated with medulloblastoma/PNET histology ($p = .036$)

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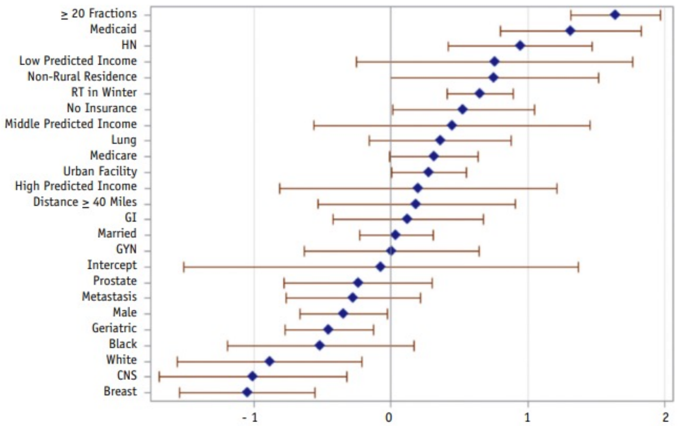
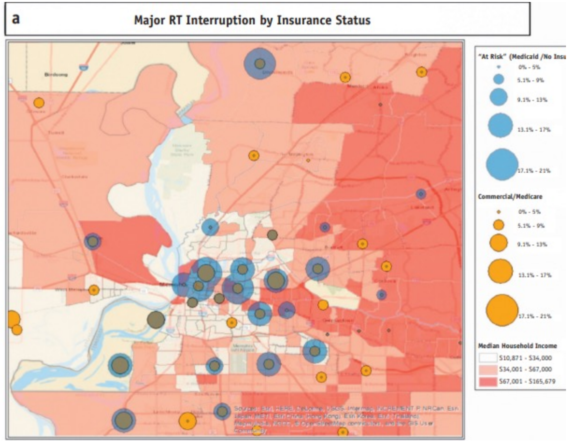
Sociology and Policy

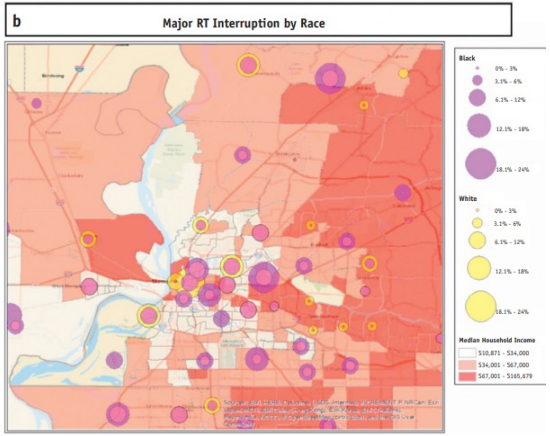
Location as Destiny: Identifying Geospatial Disparities in Radiation Treatment Interruption by Neighborhood, Race, and Insurance

Daniel V. Wakefield, MD,*,† Matthew Carnell, BS,‡

Radiation treatment interruptions **disproportionately** affects financialy and socialy vulnerable patients







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The Profession

I Can't Breathe: The Continued Disproportionate Exclusion of Black Physicians in the United States Radiation Oncology Workforce

Curtiland Deville Jr, MD,* Ian Cruickshank Jr, BS, RT(T),†

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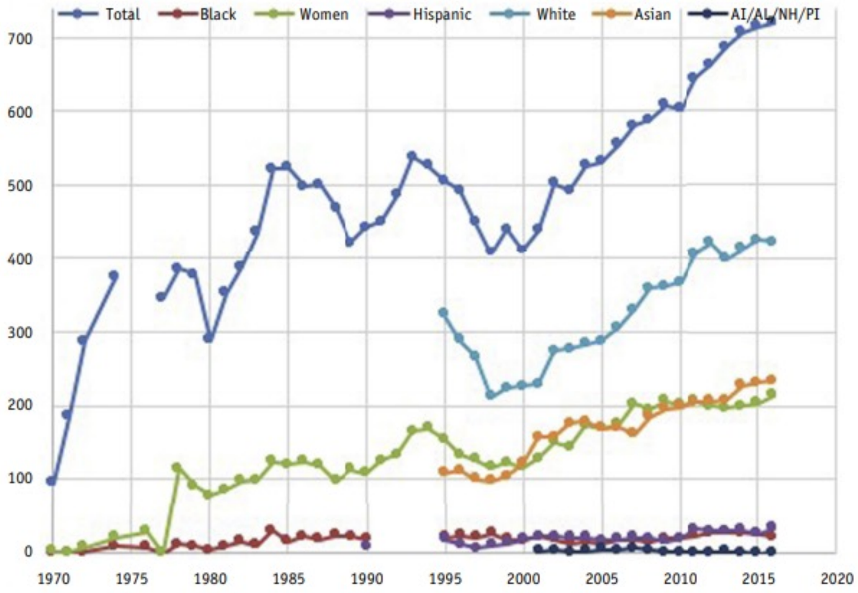
COMMENTARY

The Ethical Imperative and Evidence-Based Strategies to Ensure Equity and Diversity in Radiation Oncology

Christina Hunter Chapman, MD,* and Reshma Jagsi, MD, DPhil*,†



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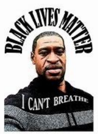

Advances in Radiation Oncology (2020) 5, 783-790

advances in radiation oncology

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Brief Opinion

Why Racial Justice Matters in Radiation Oncology

Christina Hunter Chapman, MD, MS,[a,b] Darlene Gabeau, MD, PhD,[c]

Table 3 The LEADS (Learn, Engage, Advocate, Defend, Support) approach to reducing anti-Black racism in radiation oncology: Recommendations for individual radiation cologists and radiation oncology departments/practices to combat anti-Black racism

	Individuals	Departments/institutions
Learn	• Educate yourself about implicit and structural and systemic racism and the effect on Black patients and colleagues • Read reputable literature and ask questions that will enhance understanding	• Encourage faculty and staff continuing medical education efforts that explore health equity, systemic racism, and implicit bias in health care • Sponsor antibias training for members of the practice and leadership t
Engage	• Ask Black patients and colleagues how they are coping • Engage your family members in conversations and action steps about racism and privilege • Speak to Black medical student groups about radiation oncology and offer to be a resource • Facilitate research and mentoring opportunities	• Develop regular check-ins with Black staff and faculty around climate • Review pay scales and compensation packages to ensure equity. Make corrections where needed
Advocate	• Lobby for equitable health care reform • Vote in ways that eliminate racism and dismantle the rules, laws, norms, and structures that promote it • Create diverse publication teams • Look for Black representation on speaker panels	• Review departmental and institutional policies to assess for those that propagate inequities and change them • Ensure there is Black representation among invited speakers and lectu • Encourage selection of diverse residency and faculty candidates
Defend	• Stand up against anti-Black microaggressions[20] that perpetuate racial inequity • Stand up when patients make subtle or overt anti-Black comments • Set the tone that racism is not tolerated at any level. Do not leave it to your Black colleagues to point out racism	• Reject anti-Black microaggressions[20] and departmental policies that perpetuate racial inequity • Review track record on workforce diversity from staff through faculty • Examine recruitment, hiring policies and retention rates • Develop policies that clearly condemn and reject anti-Black racism
Support	• Invest in success of Black colleagues Quote their research. Nominate them for positions of leadership Volunteer for their committees and help them produce great results • Donate to organizations that support equity and Black advancement (eg, United Negro College Fund)	• Develop a diversity, equity, and inclusion task force with actionable mandate within the practice. Ensure there is racial diversity within the group, if possible. If the department lacks diverse members, collaborat with other departments that have more success • Fund disparities research, especially by Black researchers with particul understanding of these issues • Encourage NIH-funded faculty to support Black students via NIH diversity supplement

Figure We, too, are radiation oncologists. Clockwise from top left: Drs Christina Chapman, Darlene Gabeau, Chelsea Pinnix, Curtiland Deville, Iris Gibbs, and Karen Winkfield.

Chrystal Seldon

Acknowledgement, Trasparent, Intention, Representation

Learn, Engage, Advocate, Defend, Support


IAN POULTER 72.2%
JUSTIN ROSE 71.4%
LUKE DONALD 70.0%
JOSÉ MARÍA OLAZÁBAL 66.1%
COLIN MONTGOMERIE 65.0%
SERGIO GARCIA 64.0%
GRAEME MCDOWELL 60.0%
SEVE BALLESTEROS 60.0%
DARREN CLARKE 58.0%
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RORY MCILROY 57.0%
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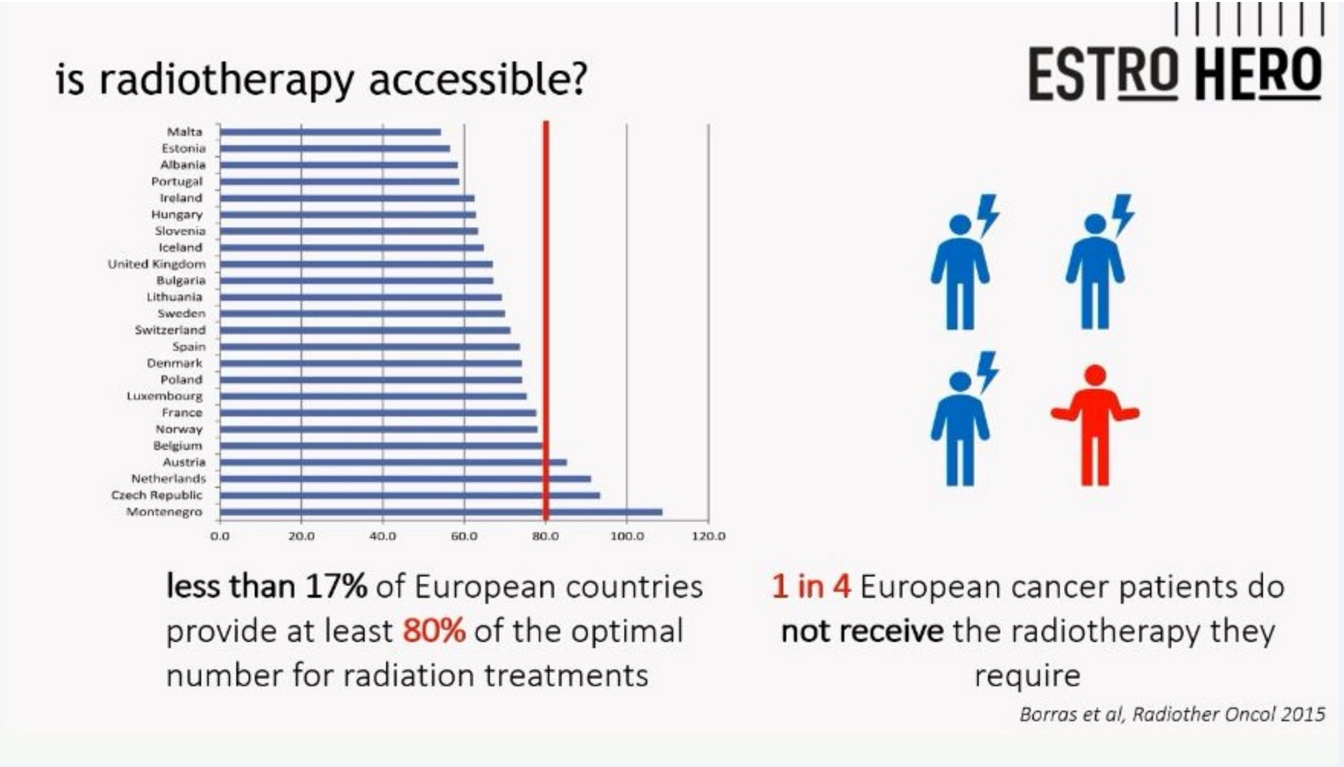
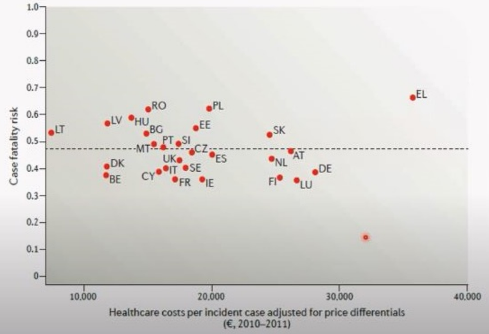
ULTIMATE EUROPEAN RYDER CUP TEAM


is radiotherapy accessible?
ESTRO HERO
Malta
Estonia
Albania
Portugal
Ireland
Hungary
Slovenia
Iceland
United Kingdom
Bulgaria
Lithuania
Sweden
Switzerland
Spain
Denmark
Poland
Luxembourg
France
Norway
Belgium
Austria
Netherlands
Czech Republic
Montenegro
0.0
20.0
40.0
60.0
80.0
100.0
120.0
less than 17% of European countries provide at least 80% of the optimal number for radiation treatments
1 in 4 European cancer patients do not receive the radiotherapy they require
Borras et al, Radiother Oncol 2015

spending more, better outcome?

comparison studies
show **no correlation** between
cancer-specific **expenditure**
(including medicines)
and **outcomes**



Sullivan et al, Nat Rev Clin Oncol 2016

radiotherapy expenses remain modest

ESTRO HERO

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European countries
spend 8-11% of their GDP on health care
cancer care takes up 4-7%

radiotherapy budgets in Europe
0,5% of total health care expenses
7,8% of oncology budgets (5-12%)

Lievens et al, Lancet Oncol 2020
Sullivan et al, Lancet Oncol 2021

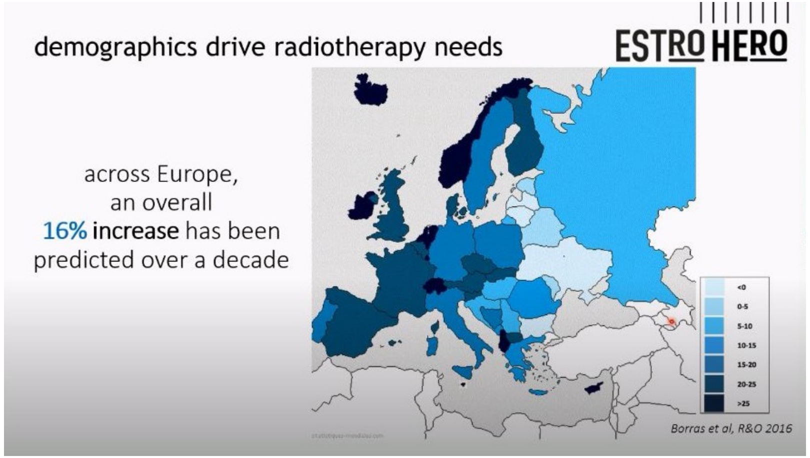
Molecular Oncology

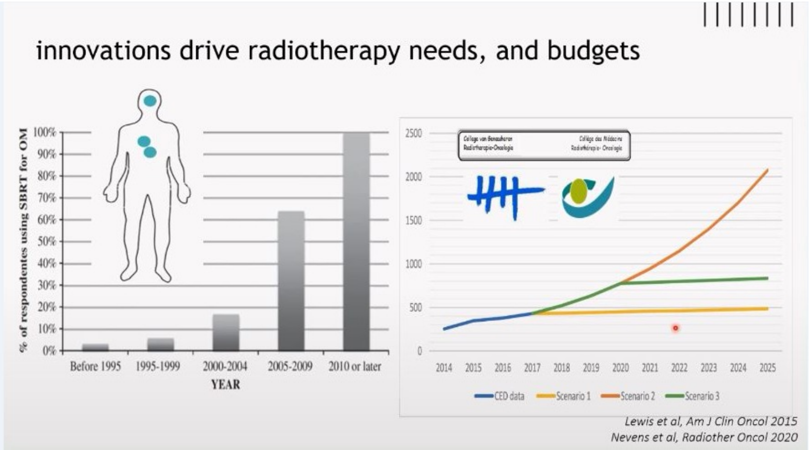
REVIEW

Molecular Oncology **14** (2020) 1461–1469 © 2020

Provision and use of radiotherapy in Europe

Yolande Lievens[1], Josep M. Borras[2] and Cai Grau[3]

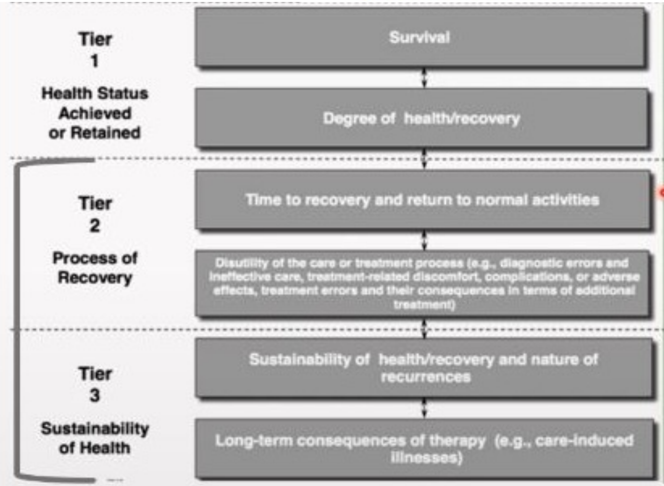




The NEW ENGLAND JOURNAL of MEDICINE
Perspective
DECEMBER 23, 2010

What Is Value in Health Care?

Michael E. Porter, Ph.D.



	ESMO-MCBS	ASCO-VF	NCCN-B
Key criteria VBHC			
Outcome	Efficacy	Efficacy	Efficacy and effectiveness
Cost	Not stated	Direct cost	Affordability
Clinical endpoints			
Overall survival	Included	Included	Not stated
Progression-free survival	Included	Included	Not stated
Disease-free survival	Included	Included	Not stated
Treatment-free interval	Not included	Included	Not stated
Cause-specific survival	Not included	Not included	Not included
Response rate	Included	Included	Not included
Treatment-related mortality	Not included	Included	Not included
Locoregional control	Not included	Not included	Not stated
Organ preservation	Not included	Not included	Not included
Reintervention rate	Not included	Not included	Not included
Quality of life	Included	Included	Not included
Toxicity and safety	Included	Included	Included
Palliation of symptoms	Not included	Included	Included

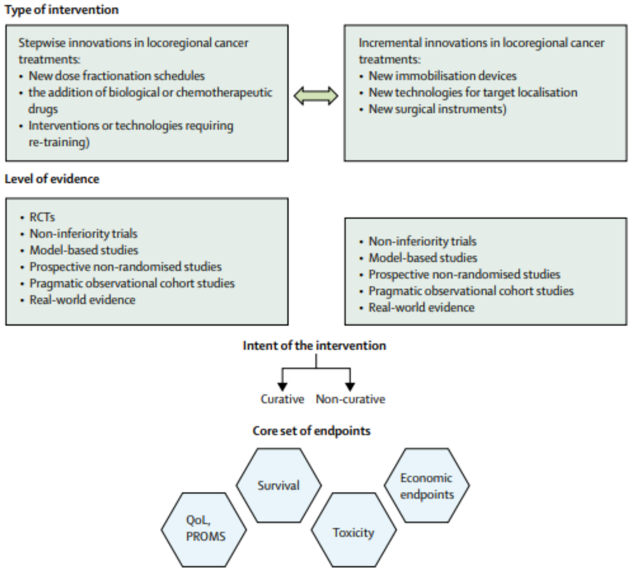
Porter M. N Engl J Med 2010
Lievens et al, Lancet Oncol 2019

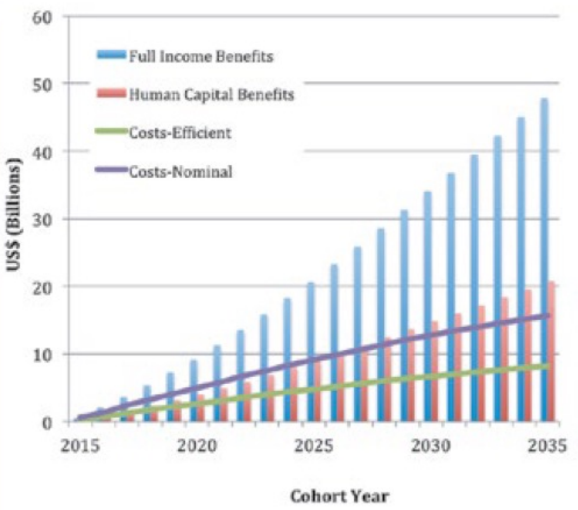
Towards an evidence-informed value scale for surgical and radiation oncology: a multi-stakeholder perspective

Yolande Lievens, Riccardo Audisio, Ian Banks, Laurence Collette, Cai Grau, Kathy Oliver, Richard Price, Ajay Aggarwal

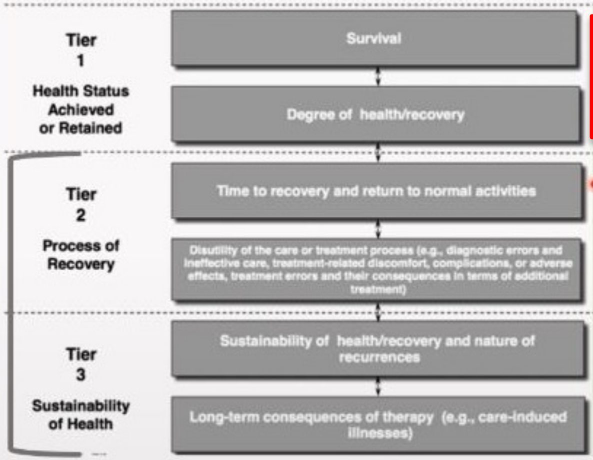
	ESMO-MCBS	ASCO-VF	NCCN-B
Key criteria VBHC			
Outcome	Efficacy	Efficacy	Efficacy and effectiveness
Cost	Not stated	Direct cost	Affordability
Clinical endpoints			
Overall survival	Included	Included	Not stated
Progression-free survival	Included	Included	Not stated
Disease-free survival	Included	Included	Not stated
Treatment-free interval	Not included	Included	Not stated
Cause-specific survival	Not included	Not included	Not included
Response rate	Included	Included	Not included
Treatment-related mortality	Not included	Included	Not included
Locoregional control	Not included	Not included	Not stated
Organ preservation	Not included	Not included	Not included
Reintervention rate	Not included	Not included	Not included
Quality of life	Included	Included	Not included
Toxicity and safety	Included	Included	Included
Palliation of symptoms	Not included	Included	Included

ESMO-MCBS=European Society for Medical Oncology Magnitude of Clinical Benefit Scale. ASCO-VF=American Society of Clinical Oncology Value Framework. NCCN-B=National Comprehensive Cancer Network Blocks. VBHC=value-based health care.





value-based healthcare as a tool to keep care **accessible** and **sustainable** - *outcomes*



	ESMO-MCBS	ASCO-VF	NCCN-B
Key criteria VBHC			
Outcome	Efficacy	Efficacy	Efficacy and effectiveness
Cost	Not stated	Direct cost	Affordability
Clinical endpoints			
Overall survival	Included	Included	Not stated
Progression-free survival	Included	Included	Not stated
Disease-free survival	Included	Included	Not stated
Treatment-free interval	Not included	Included	Not stated
Cause-specific survival	Not included	Not included	Not included
Response rate	Included	Included	Not included
Treatment-related mortality	Not included	Included	Not included
Locoregional control	Not included	Not included	Not stated
Organ preservation	Not included	Not included	Not included
Reintervention rate	Not included	Not included	Not included
Quality of life	Included	Included	Not included
Toxicity and safety	Included	Included	Included
Palliation of symptoms	Not included	Included	Included

Porter M. N Engl J Med 2010
Lievens et al, Lancet Oncol 2019

Radioterapia Oncologica:
l'evoluzione al servizio dei pazienti

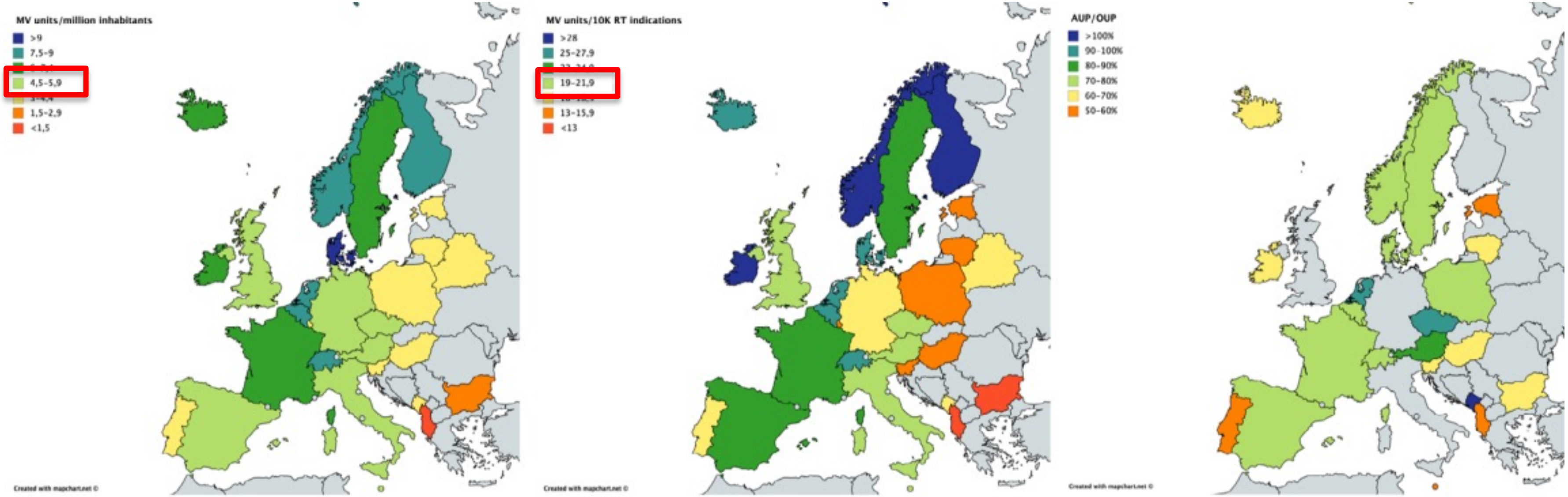
Molecular Oncology

REVIEW

Molecular Oncology **14** (2020) 1461–1469 © 2020

Provision and use of radiotherapy in Europe

Yolande Lievens[1], Josep M. Borras[2] and Cai Grau[3]

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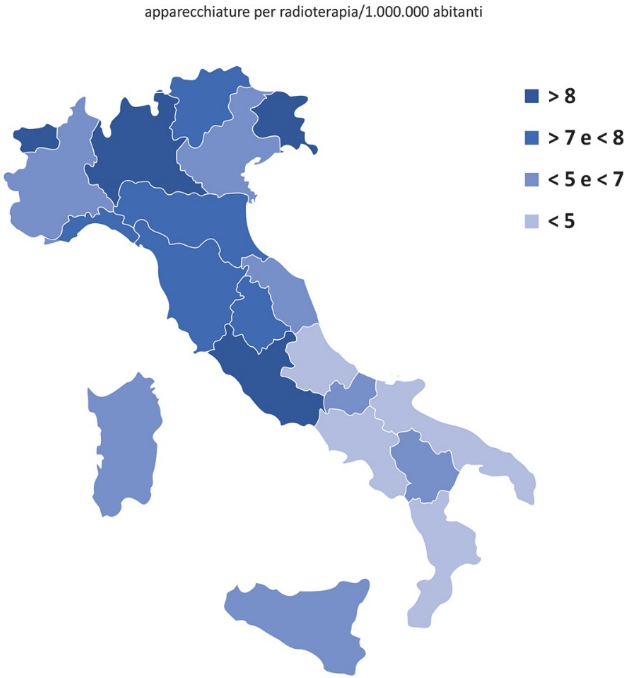
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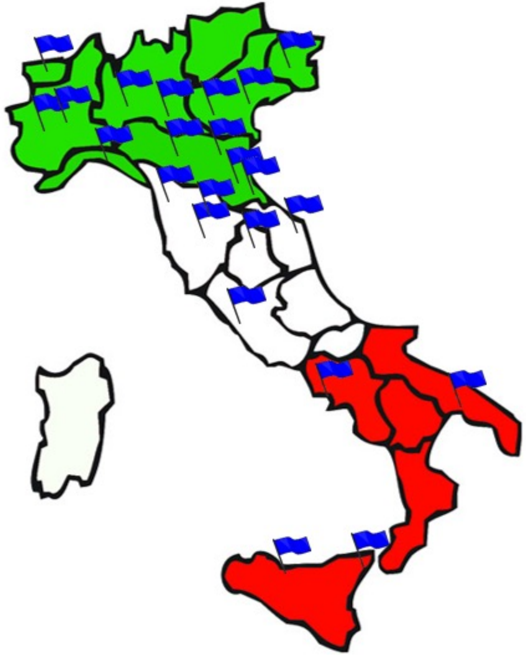

Di seguito, è stato analizzato l'andamento di quattro specializzazioni tra quelle più carenti

Scuola di specializzazione	Banditi			Immatricolati			
	2022	2023	Totale	2022	2023	Totale	%
Medicina d'emergenza	886	945	**1831**	356	228	**584**	**31%**
Microbiologia	131	121	**252**	19	13	**32**	**12%**
Patologia Clinica	251	251	**502**	68	36	**104**	**20%**
Radioterapia	155	181	**336**	41	23	**64**	**19%**

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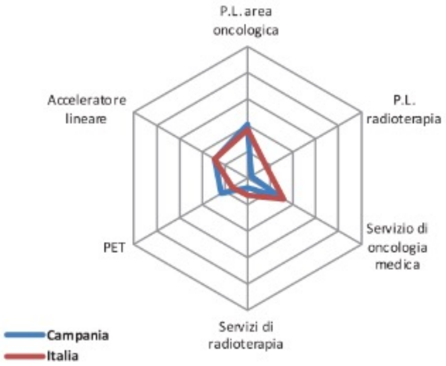
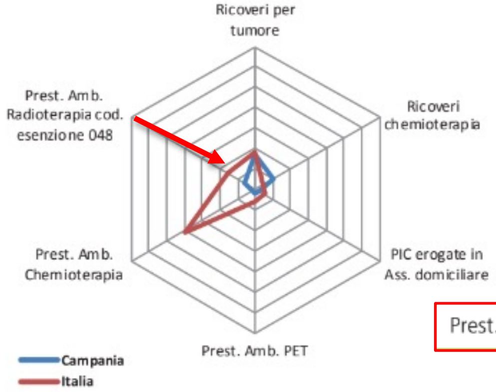
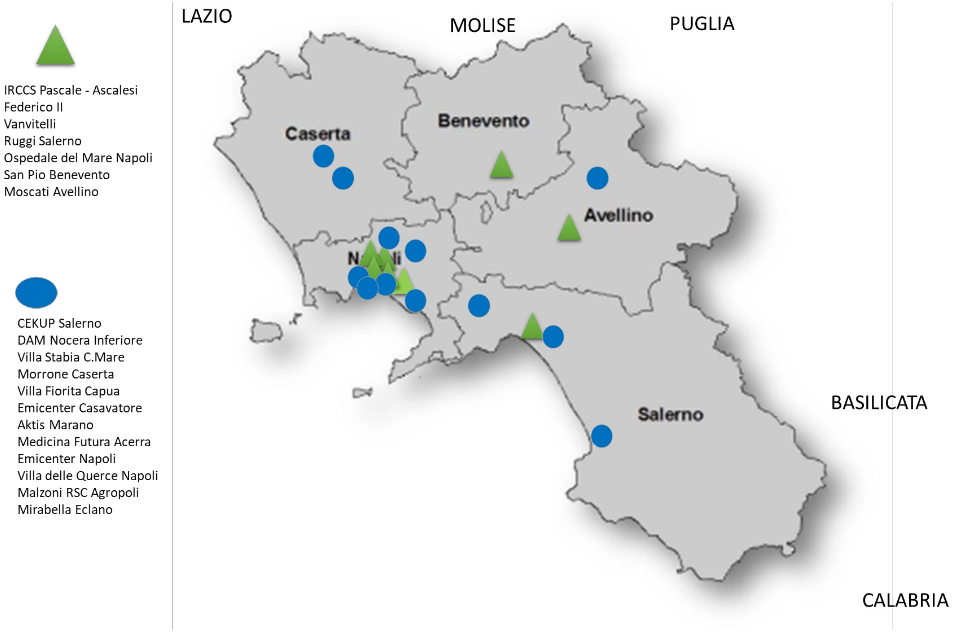
Radioterapia Oncologica: l'evoluzione al servizio dei pazienti

15° Rapporto sulla condizione assistenziale dei malati oncologici

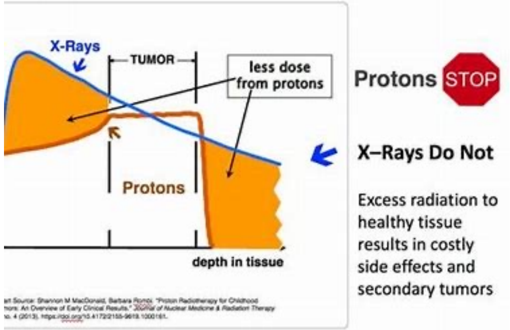
31. Le finestre regionali







Prest. Amb. Radioterapia cod. 048 per 100 Ab.	3,27	7,62



Come accedere al trattamento adroterapico | Iter e regolamentazione (fondazionecnao.it)
Valutazione e accesso alla terapia protonica - Protonterapia Trento (provincia.tn.it)

CNAO Centro Nazionale di Adroterapia Oncologica

PATOLOGIE TRATTABILI | ACCESSO ALLA TERAPIA | ADROTERAPIA | PERCORSO TERAPEUTICO | AREA PAZIENTI | RICERCA | AREA MEDICI | DONA

Come accedere ad un trattamento di adroterapia?

CNAO, Centro Nazionale di Adroterapia Oncologica, è l'unico centro in Italia, insieme ad altri soli cinque nel mondo, in grado di erogare adroterapia sia con protoni che con ioni carbonio (adroni).

I cittadini italiani possono accedere al trattamento tramite il **Servizio Sanitario Nazionale** (SSN) oppure in **regime di solvenza**.

Accesso tramite il Sistema Sanitario Nazionale

Per accedere al trattamento tramite il Sistema Sanitario Nazionale è necessario **inviare a CNAO la propria documentazione clinica**, che sarà sottoposta ad una valutazione preliminare dal nostro team multispecialistico. La documentazione può essere inviata per **posta** oppure direttamente **dal nostro sito**. Di seguito le indicazioni.

CONTINUA A LEGGERE

Accesso in regime di solvenza

Per accedere al trattamento in regime di solvenza è necessario prendere contatto con l'**Ufficio Accettazione di CNAO**.

Il personale fornirà i dettagli per poter inviare la documentazione clinica necessaria alla valutazione preliminare. Di seguito le indicazioni.

CONTINUA A LEGGERE

PROTONTERAPIA TRENTO

Contatti | Come raggiungerci | Eventi e news | Enti e associazioni di volontariato | ITA ENG DEU

IL CENTRO E LO STAFF | I VANTAGGI DELLA PROTONTERAPIA | PER I PAZIENTI | PER I RICERCATORI

Azienda Provinciale per i Servizi Sanitari Provincia Autonoma di Trento

RICHIESTA INFO E ORARI

+39 0461 1953100

COME ACCEDERE ALLE PRESTAZIONI

La **protonterapia** è una tipologia di trattamento dei tumori che l'Azienda Provinciale per i Servizi Sanitari della Provincia Autonoma di Trento mette a disposizione dei pazienti autorizzati dai rispettivi Servizi Sanitari di appartenenza.

La richiesta di valutazione per un eventuale **trattamento di protonterapia** può essere inoltrata **dal medico curante, da uno specialista o dal paziente stesso** alla Segreteria dell'Unità Operativa di Protonterapia con le seguenti modalità:

- compilando il form on line
- telefonando (dal lunedì al venerdì dalle 8.30 alle 16.00) ai numeri:
  - 0461 1953100
  - 0461 1953101
  - 0461 1953115
- inviando una e-mail all'indirizzo: protonterapia@apss.tn.it;
- rivolgendosi direttamente all'**Unità Operativa di Protonterapia**, in via Al Desert n. 14, negli orari di apertura della segreteria.

La **segreteria dell'Unità Operativa** si occuperà di contattare il richiedente, di fornire le indicazioni in merito alla documentazione sanitaria necessaria ai fini della valutazione del caso clinico, di comunicare l'esito della valutazione e, in caso di accettazione, di fissare l'appuntamento per la prima visita.

La documentazione ricevuta non verrà restituita.

Protoni

Clinical Oncology 35 (2023) e528–e536

Contents lists available at ScienceDirect

ELSEVIER

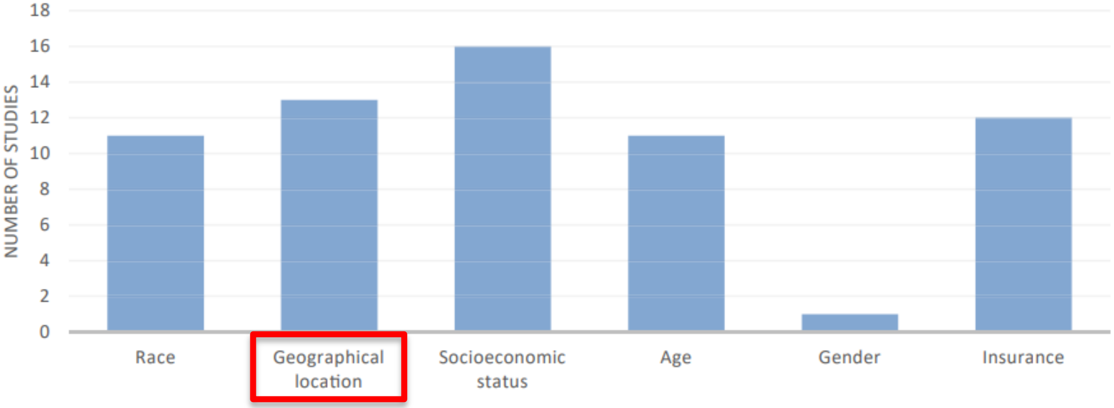
Clinical Oncology

journal homepage: www.clinicaloncologyonline.net

Overview

Assessing Equity of Access to Proton Beam Therapy: A Literature Review

S. Gaito *†‡, M.C. Aznar †, N.G. Burnet ‡, A. Crellin †§, A. France *, D. Indelicato ¶, K.J. Kirkby †‡, S. Pan ‡, G. Whitfield †‡, E. Smith *†‡



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Radioterapia Oncologica:
l'evoluzione al servizio dei pazienti

Access to Radiation Therapy: From Local to Global and Equality to Equity

Sarbani Ghosh Laskar, MD[1]; Shwetabh Sinha, MD[1]; Rahul Krishnatry, MD[1]; Cai Grau, MD[2]; Minesh Mehta, MD[3]; and

JCO Global Oncol 8:e2100358. © 2022 by American Society of Clinical Oncology