

## HUMAN RESOURCES FOR TREATING NEW CANCER CASES IN CZECH REPUBLIC

### Executive Summary

The purpose of this report is to describe the human resources needed in Czech Republic to treat new cancer patients. The population of Czech Republic is approximately 10.57 million (5.19 million men and 5.38 million women) and the estimated number of new cancer cases in Czech Republic for the year 2012, based on GLOBOCAN data for Czech Republic as a whole (<http://globocan.iarc.fr/>) was 57627 (30716 in men and 26911 in women) (Table A).

The five most common cancers in Czech Republic are (1) urological (bladder, kidney, prostate and testis), (2) colorectal, (3) breast, (4) lung and (5) gynecological (cervix uteri, corpus uteri and ovary).

Table A: The ten most frequently occurring cancers in Czech Republic for men and women based on 2012 GLOBOCAN data.

Cancer	BOTH SEXES		MEN		WOMEN	
	Incidence	Rank	Incidence	Rank	Incidence	Rank
All cancers excl. non-melanoma skin cancer	57627		30716		26911	
Urological	13119	1	11234	1	1885	5
Colorectal	8336	2	4978	2	3358	3
Breast	6854	3			6854	1
Lung	6683	4	4624	3	2059	4
Gynecological	4000	5			4000	2
Head and Neck	3134	6	1762	4	1372	7
Hematological	2969	7	1578	5	1391	6
Melanoma of skin	2194	8	1146	6	1048	8
Pancreas	2118	9	1086	7	1032	9
Stomach	1595	10	944	8	651	10
Gallbladder	966	11	325	12	641	11
Liver	919	12	581	9	338	13
Brain, nervous system	838	13	422	11	416	12

Esophagus	593	14	482	10	111	14
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Newly diagnosed cancer patients need pathology, surgery, chemotherapy and/or radiation therapy. The number of oncologists needed is based, therefore, on the number of patients requiring pathology, surgery, chemotherapy and radiation therapy (Table B). This number is estimated from the percentage of patients requiring surgery, chemotherapy and/or radiation therapy for the top ten cancers in both men and women.

For developing countries the International Atomic Energy Agency (IAEA) recommends training Radiation/Clinical Oncologists who can prescribe both radiation and chemotherapy for the common solid cancers, instead of separate medical and radiation oncologists. Hematological malignancies are treated primarily by hematologist-oncologists. The number of specialists needed is based upon the number of cancer patients but each city, in order to ensure coverage if one person leaves or goes on vacation, must have at least 2 surgical oncologists, 2 radiation/clinical oncologists, 2 hematologist oncologists, etc.

Table B: Number of Oncologists needed for Czech Republic's 2 most populous cities based on 2014 population estimates (<http://citypopulation.de/>) and 2012 GLOBOCAN data for new cancer cases.

	Population	New Cancer Cases	Hematologist Oncologists	Surgical Oncologists	Radiation / Clinical Oncologists	Urologic Oncologists	Gynecologic Oncologists	Pathologists
Praha	1243201	6782	2 <sup>‡</sup>	8	34	4	2 <sup>‡</sup>	14
Brno	377508	2060	2 <sup>‡</sup>	3	11	2 <sup>‡</sup>	2 <sup>‡</sup>	5

<sup>‡</sup>At least 2 are needed in each city.

In addition to oncologists, support staff such as onco-pharmacists, pharmacy technicians, oncology nurses and palliative care specialists is also needed. Many cancer patients require hospitalization for diagnosis, treatment and/or complications, therefore an adequate number of oncology beds will be needed. The number of oncology nurses, onco-pharmacists and pharmacy technicians needed is based upon the number of beds occupied daily by cancer patients while the number of palliative care specialists is based on the number of new cancer cases per year (Table C). The oncology nursing staff for each 24-bed oncology unit (operating 24 hours a day, 7 days a week) comprises of one head nurse and a nurse specialist as well as 13 nurses working 8 hour shifts, 5 days per week.

Table C: Number of Oncology Units, Nursing and Pharmacy Staff needed for Czech Republic's 2 most populous cities based on 2014 population estimates and 2012 GLOBOCAN data for new cancer cases.

	New Cancer Cases	Maximum # of beds/day	# of 24 bed oncology wards	Onco-Pharmacists	Onco-Pharmacy Technicians	Palliative Care Specialists	Oncology Nursing Staff other than Radiation Oncology Nurses
Praha	6782	121	6	24	36	14	90

Brno	2060	37	2	8	12	5	30
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Since many cancer patients require radiotherapy, appropriately equipped facilities will be needed along with radiation oncology staff (Tables D and E). Radiation oncology staff includes radiation therapy technicians, medical physicists, Linac engineers and radiation oncology nurses in addition to radiation/clinical oncologists. The minimum radiation therapy equipment requirements are at least one of each: Linac, brachytherapy unit, CT simulator, treatment planning computer and dosimetry/quality assurance package.

Table D: Radiation Therapy Staff needed for Czech Republic's 2 most populous cities based on 2014 population estimates and 2012 GLOBOCAN data for new cancer cases.

	New Cancer Cases	Radiation / Clinical Oncologists	Radiation Therapy Technicians	Medical Physicists	Linac Engineers	Radiation Oncology Nurses
Praha	6782	34	45	15	4	15
Brno	2060	11	14	5	2	5

Table E: Radiation Therapy Equipment needed for Czech Republic's 2 most populous cities based on 2014 population estimates and 2012 GLOBOCAN data for new cancer cases.

	New Cancer Cases	Linacs / Co 60 Megavolt Units	# of Brachytherapy units	# CT simulators	# of treatment planning computers	# of dosimetry/ QA package
Praha	6782	8	4	4	4	4
Brno	2060	3	2	2	2	2

NOTE: Guidelines from the IAEA of the United Nations were used to calculate the radiation therapy equipment and staff needed in the setting of a developing country. Guidelines from the Oncology Nursing Society were used to calculate the number of nurses needed. Several other specialty societies were also requested to provide guidelines but in most cases there were none, therefore colleagues active in those fields were consulted for estimating the number of staff needed.