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Comparison of prostate cancer patient's survival in Belarus and Lithuania

Research Article

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Abstract: Background. The aim of this paper is to describe the five-year survival rates for prostate cancer in two populations using data from population-based cancer registries: Belarus and Lithuania.
Materials and Methods. All newly diagnosed cases of prostate cancer (ICD-10, C619) in men were identified in the Lithuanian cancer registry and the Cancer Registry of Belarus for the period 2000-2004. Five-year relative survival estimates were examined with the Ederer II method using STATA statistical software.
Results. Relative 5-year survival of patients diagnosed with prostate cancer in 2000-2004 was 43.0% in Belarus and 64.5% in Lithuania. 5-year survival rates by age group were higher in Lithuania: in all age groups 5-year survival rates were between 60 and 70%. In Belarus survival rates were lowest in age group 15-64 years (33.9%) the highest survival was observed in the patients 75 years and older (51,7%). Survival rates at stages I, II and III were substantially higher in the Lithuanian prostate cancer patients. No differences in survival were found only at stage IV of disease.
Conclusions. Prostate cancer patients in Lithuania had greater survival rates than patients in Belarus. Observed differences in survival of prostate cancer patients needs to be explained in the future research.

Keywords: *Prostate cancer • Relative survival*

1. INTRODUCTION

Prostate cancer is one of the most prevalent cancers in men. Internationally, prostate cancer is the second most common cancer diagnosed among men (behind lung cancer), and is the sixth most common cause of cancer death among men. Prostate cancer is particularly prevalent in developed countries such as the United States and the Scandinavian countries, with about a six-fold difference between high-incidence and low-incidence countries [1]. Prostate cancer now is the most frequent cancer diagnosed in men in Europe [2].

Patterns in cancer incidence can provide important insight into the impact of lifestyle upon cancer development whereas patterns in survival can provide information about the overall effect of the management of cancer in the population. According to the EUROCARE studies survival varies greatly across Europe for common and rare malignancies [3-5]. These variations can be explained by a number of factors, including differences in the quality of cancer treatment facilities, in screening programmes, in evidence based best practice guidelines, in facilities for radiotherapy, and in access to new anticancer drugs. Identifying differences in survival between populations can help to uncover gaps in systemic policy and program delivery, and support the planning of enhanced cancer control systems.

The aim of this paper is to describe the five-year survival rates for prostate cancer in two populations

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using data from population-based cancer registries: Belarus and Lithuania.

2. MATERIALS AND METHODS

2.1. Populations of study and data sources

The Republic of Lithuania is situated on the eastern coast of the Baltic sea. It is borders Belarus on the east and has a population approximately 3.4 million and the surface area is 65 300 km^2. The capital city, Vilnius, has a population of 580 000 and 68% of the population live in urban areas.

The Republic of Belarus, an independent state since 1991, has a current population of 10 335 000; 69% are between 15 and 64 years of age. The country includes a land area of about 207 600 km^2. Belarus borders Lithuania on the northwest.

Lithuanian Cancer Registry is a population based cancer registry. It contains personal and demographic information as well as information on diagnosis and death of all the cases of cancer, diagnosed among all residents.

The registration of cancer incidence in Lithuania started in 1957. Department of Epidemiology of the Institute of Oncology was responsible for collection, statistical and epidemiological interpretation of data. The national Cancer Registry was founded in 1984. At present the Cancer Registry operates as the Cancer Registration Department of Institute of Oncology, Vilnius University. In 1993, Lithuanian Cancer Registry became a full member of the International Association of Cancer Registries (IACR) in Lyon, France.

The principal sources of information on cancer cases are primary, secondary and tertiary health care institutions in the country that are responsible to fill in the notification when cancer is diagnosed. All physicians, all hospitals and other institutions in the country must send a notification to Lithuanian Cancer Registry of all cancer cases that come to their attention. Some pathological laboratories send the respective laboratory notification automatically extracted from laboratory data systems, using a standard format. The notifications, supplemented by death certificate information from Department of Statistics (until 2005), are built into a database suitable for statistical use. The database contains information on all cancer cases diagnosed in residents of Lithuania since 1978. This data base is used for statistical and research purposes.

In Lithuania, information on survival status and the date of death (if deceased) was routinely collected by the cancer registry from the Death certificates and government vital statistics – Population Registry.

In Belarus, cancer registration is considered mandatory, and has been carried out since 1953. However, until the beginning of the 1970s it was performed on the basis of the required official statistical reports without the formation of computer databases in which personified cancer cases could be stored. In 1973, in Belarus the formation of computer files on the magnetic tapes and disks was initiated and information on each new cancer case, registered in the current year, was entered into them. In 1995-1997, the development of a successive version for the automated data processing system of the Belarusian Cancer Registry was performed. In 1999, the introduction of this program into all dispensaries of Belarus was completed.

Most information is entered into computer directly from basic medical documents (outpatient medical card and inpatient medical card) stored in the oncological dispensaries. Besides, special notifications and extracts from medical documents of other health care institutions (Research Institute for Oncology and Medical Radiology, Republican Scientific-Practical Centre for Pediatric Oncology and Hematology, Centre for Thyroid Tumours Pathology, hematological hospitals, hospitals with cancer beds, polyclinics, departmental health care institutions etc.), where cancer has been diagnosed, are sent to the oncological dispensaries. The notification cancer forms should be filled in and sent to the oncological dispensaries also by the pathomorphologists in case of post-mortem cancer diagnosis.

Additional sources of information on cancer patients are death certificates, which are checked monthly by the personnel of the oncological dispensaries and district cancer rooms. This monthly monitoring is conducted in the departments of vital statistics in order to locate documents that list cancer as the cause of death or concomitant disease for patients. All these cases revealed are compared with the database of the oncological dispensary. For each cancer case not found there the information is requested from source of information, i.e. from the institution where the conclusion on causes of death was made. After information check and confirmation the data on a new cancer case is entered into the database of the oncological dispensary. The survival status of all registered cancer patients is collected by region oncologists.

2.2. Data analysis

All newly diagnosed cases of prostate cancer (ICD-10, C619) in men were identified in the Lithuanian cancer registry and the Cancer Registry of Belarus for the period 2000-2004. This analysis includes male patients diagnosed with malignant prostate tumors, excluding diagnoses confirmed by autopsy or death certificate only.

Five-year relative survival estimates were calculated for three age groups: 15-64, 65-74, and 75+, for the period 2000-2004. Relative survival estimates were derived as a ratio of the absolute survival of the cancer patients divided by the expected survival of an age-matched group of the underlying male general population [6].

The survival duration of each case was determined as the time difference between the date of initial diagnosis and the date of death, date of loss to follow-up, or closing date for follow-up. The relative survival rates were examined with the Ederer II method using an algorithm written in STATA (StataCorp. 2009. Stata Statistical Software: Release 11. College Station, TX, USA) by Paul Dickman [7].

3. RESULTS

Overall, 14,076 cases of prostate cancer were included in the analysis. Mean age of prostate cancer patients was similar in both countries (70.19±7.95 and 71.63±8.43 in Belorus and Lithuania respectively). Table 1 provides distribution of cases in both cancer registries in the examined period.

Prostate cancer patients in Lithuania had greater 1-year and 5-year survival rates than patients in Belarus. Relative 5-year survival of patients diagnosed with prostate cancer in 2000-2004 was 43.0% in Belarus and 64.5% in Lithuania (Table 2).

5-year survival rates for male prostate cancer cases diagnosed in 2000-2004 by age group were higher in Lithuania: in all age groups 5-year survival rates were similar, between 60 and 70%. In Belarus survival rates were lowest in age group 15-64 years (33.9%) the highest survival was observed in the patients 75 years and older (51,7%).

The stage of the disease was an important determinant of survival in patients with prostate cancer, with the higher survival in the earlier stages; however survival rates at stages I, II and III were substantially higher in the Lithuanian prostate cancer patients, than in Belarus. No differences in survival were found only at stage IV of disease (15.2% and 16.2% in Belarus and Lithuania respectively).

Table 1 Study group characteristics: distribution of patients with prostate cancer, by registry, age group, and stage of disease

Country		Belarus Cases	%	Lithuania Cases	%
Total		6970	100.00	7106	100.00
Age group	15-64	1526	21.89	1319	18.56
	65-74	3321	47.65	3199	45.02
	75+	2123	30.46	2588	36.42
Stage	I	285	4.09	299	4.21
	II	2172	31.16	2038	28.68
	III	2672	38.34	3210	45.17
	IV	1714	24.59	1048	14.75
	unknown	127	1.82	511	7.19

4. DISCUSSION

This is the first study comparing survival of cancer patients between Belarus and Lithuania and the differences in prostate cancer survival rates between these two populations were found. Relative 5-year survival of patients diagnosed with prostate cancer in 2000-2004 was 43.0% in Belarus and 64.5% in Lithuania.

Comparative survival studies, such as EUROCARE study of last two decades, have shown that large between-country and within-country differences in

Table 2 5-year relative survival of patients with prostate cancer, by registry, age group, and stage of disease

		Relative survival, %			
		1 year	95% CI	5 years	95% CI
Country					
Overall					
Belorus		73.91	72.56- 75.23	42.99	41.25- 44.74
Lithuania		83.63	82.42- 84.80	64.51	62.69- 66.31
Age group					
Belarus	15-64	66.00	63.29-68.59	33.90	31.08-36.78
	65-74	73.52	71.60-75.37	42.87	40.47-45.30
	75+	81.14	78.42-83.76	51.65	47.53-55.89
Lithuania	15-64	84.01	81.59-86.22	63.48	60.13-66.74
	65-74	85.35	83.68-86.93	67.43	64.93-69.90
	75+	81.12	78.73-83.42	60.78	56.98-64.64
Stage					
Belarus	I	91.28	84.96-96.54	72.14	62.22-81.86
	II	88.47	86.24-90.57	58.35	54.90-61.81
	III	78.73	76.59-80.80	45.85	42.99-48.76
	IV	46.75	44.06-49.42	15.62	13.46-17.98
	unknown	55.45	43.64- 66.65	33.00	20.67- 47.84
Lithuania	I	100	95.88-100	91.74	82.77-99.97
	II	98.84	97.11-100	79.35	76.01-82.62
	III	87.38	85.63-89.04	68.84	66.09-71.58
	IV	40.95	37.58-44.33	16.16	13.35-19.27
	unknown	72.30	66.83- 77.35	56.86	49.62- 64.16

survival were present in Europe, and survival was generally lower in Eastern European countries than elsewhere [5,8]. An analysis of more recent data has indicated a general pattern of lower survival in Eastern Europe (compared to all other regions), in spite of the observation that survival differences between European populations are narrowing [9].

Survival differences between countries have been largely attributed to differences in patient's age, stage of disease at diagnosis, and the presence of metastasis. Stage of the disease is an important determinant of survival in patients with prostate cancer, but stage of diagnosed disease can not explain the observed survival differences in these two populations: survival rates at stages I, II and III were substantially higher in the Lithuanian prostate cancer patients, than in Belarus.

Testing for prostate specific antigen (PSA) has been widely used for the early detection of prostate cancer in Lithuania in years 2000-2004, but not in Belarus. The difference between countries is most likely to be due to the use of PSA testing, which leads to earlier diagnosis of patients with asymptomatic metastasis, resulting in a seemingly better survival. Other possible reason can also be misclassification in staging. Radical prostatectomy in Belarus was introduced in 1999-2000 and was available only in some specialized centers. Therefore some patients registered as having localized prostate cancer actually had lymph node metastases. The increase in public awareness with regard to the possible benefits in early diagnosis of prostate cancer, the increasing use of PSA and digital rectal examination and the availability of transrectal ultrasound and extended systematic and sextant biopsies for prostate cancer detection could contribute the upward trend in prostate survival in the future.

In the analysis of survival of patients diagnosed with prostate cancer in the 12 European cancer registries between 2000 and 2004 showed the highest model-based age-adjusted 5-year relative survival estimates in Saarland, Germany (93%) and Torino, Italy (92%), whilst substantially lower – in Scotland, Lithuania and Estonia (around 75% in 2004), and lowest in Slovenia and Cracow, Poland at 67% and 58%, respectively. Trends between 2000 and 2004 indicated rapid increases in survival in Lithuania from 47.0% to 74.1% [10]. The rises in the 5-year relative survival of prostate cancer patients have been described in other survival analyses [11-14].

Dramatic increases in survival of prostate cancer patients are very likely due to increased lead time and over diagnosis resulting from rapidly increasing use of the (PSA) test in European populations [15-17]. Also advances in hormonal therapy could have contributed to real improvements in patient survival [18,19].

Interpretation of survival rate differences is complicated by the increasing impact of PSA testing. Increasing survival rates are becoming widespread, although it is not clear whether this is due to earlier diagnosis (PSA testing), improved treatment, or some combination of these or other factors [20].

We hypothesize that the survival differences observed in prostate cancer patients is influenced by both, policy and practices regarding diagnosis and treatment of prostate cancer patients in Belarus and Lithuania.

CONSLUSIONS

Prostate cancer patients in Lithuania had greater survival rates than patients in Belarus. Observed differences in survival of prostate cancer patients needs to be explained in the future research.

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